APPENDIX B. Directory of SMD E/PO Programs

This directory provides overview information on the overall Education and Public Outreach (E/PO) program activities of each Science Mission Directorate (SMD) mission or program. (A list of mission/program acronyms is provided in appendix I.) Each listing contains the following information:

Title:
Title of the mission or program.

Description:
Overview description of the E/PO activities conducted by the mission or program.

Lead:
Person or organization with lead E/PO responsibility for the mission or program.

Contact:
Person or organization with contact E/PO responsibility for the mission or program.

URL:
Web address for further information on the mission's or program's E/PO activities.

Activities (or Grants):
Indexed listing of all E/PO products and activities conducted or supported by the mission or program (or of all active E/PO grants supported by the program).

The listings are grouped into categories as follows:

Earth Science Missions and Programs
- Earth Science Missions
- Earth Science Projects

Space Science Programs and Partnerships
- Grants Programs
- Major Partnerships

Space Science Education and Public Outreach (E/PO) Support Network
- Forums
- Broker/Facilitators

Astrophysics Missions
- Major Missions
- Explorers
- Navigator
- Attached Payloads
- Other NASA Programs
- International Missions with NASA Participation

Heliophysics Missions
- Major Missions
- Explorers
- International Solar-Terrestrial Physics (ISTP)
- Solar Terrestrial Probes (STP)
- Other NASA Programs
- International Missions with NASA Participation

Planetary Science Missions
- Major Missions
- Mars Exploration Program
- New Frontiers
- Discovery
- Other NASA Programs
- International Missions with NASA Participation

EARTH SCIENCE MISSIONS AND PROGRAMS

Earth Science Missions

B1. ACRIMSAT

Description: The ACRIMSAT Mission will measure Total Solar Irradiance (TSI) during its 5-year mission life. The ACRIMSAT spacecraft, carrying the Active Cavity Radiometer Irradiance Monitor III (ACRIM III) instrument, was the secondary payload on a Taurus vehicle that launched in December 1999. The instrument, third in a series of long-term solar-monitoring tools built for NASA by the Jet Propulsion Laboratory, will continue to extend the database first created by ACRIM I, which was launched in 1980 on the Solar Maximum Mission (SMM) spacecraft. ACRIM II followed on the Upper Atmosphere Research Satellite (UARS) in 1991. The ACRIM I instrument was the first to demonstrate clearly that the total radiant energy from the Sun was not a constant. However, the solar variability was so slight (0.1 percent of full scale) that continuous monitoring by state-of-the-art instrumentation was necessary. It is theorized that as much as 25 percent of the anticipated global warming of Earth may be solar in origin. In addition, seemingly small (0.5-percent) changes in the TSI output of the Sun over a century or more may cause significant climatological changes on Earth.
URL: *http://science.hq.nasa.gov/missions/satellite_55.htm*
Activities: Earth System Science Fellowship Program [A8]

B2. Aqua

Description: Aqua is a NASA Earth science satellite mission named for the large amount of information that the mission is collecting about Earth's water cycle, including evaporation from the oceans, water vapor in the atmosphere, clouds, precipitation, soil moisture, sea ice, land ice, and snow cover on the land and ice. Additional variables also being measured by Aqua include radiative energy fluxes; aerosols; vegetation cover on the land; phytoplankton and dissolved organic matter in the oceans; and air, land, and water temperatures. The Aqua mission is a part of the NASA-centered international Earth Observing System (EOS). Aqua was formerly named EOS PM, signifying its afternoon equatorial crossing time. Aqua was launched on May 4, 2002, and has six Earth-observing instruments on board, collecting a variety of global data sets. Aqua was the first member launched of a group of satellites termed the Afternoon Constellation, or sometimes the A-Train. The second member to be launched was Aura, in July 2004, and the third member was the Polarization & Anisotropy of Reflectances for Atmospheric Sciences coupled with Observations from a Lidar (PARASOL), in December 2004. The next members launched were CloudSat and Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Observations (CALIPSO), in April 2006.
URL: *http://science.hq.nasa.gov/missions/satellite_17.htm*
Activities: Aqua: Presentations by the Aqua Project Scientist [A391]
Aqua: Web Site [A449]
Atmospheric Infrared Sounder (AIRS) Student Internship [A7]
Atmospheric Infrared Sounder (AIRS): Public Web Site [A453]
Atmospheric Infrared Sounder (AIRS): Automated Daily Weather Maps [A454]
Atmospheric Infrared Sounder (AIRS): Earth Science Music Video [A455]
Atmospheric Infrared Sounder (AIRS): Quarterly Newsletter [A456]
LA's Better Educated Students for Tomorrow (BEST) [A294]
Satellite Observations in Science Education [A231]
"WeatherStreet.com" [A504]

B3. Aura

Description: The Aura mission researches the composition, chemistry, and dynamics of Earth's atmosphere and studies the ozone, air quality, and climate. The Aura project supports a strong educational and public outreach (E/PO) effort through formal and informal education partnerships with organizations that are leaders in science education and communication. Our partners include the Smithsonian Institution's National Museum of Natural History (NMNH), the American Chemical Society (ACS), and the GLOBE Program. Our goal is to educate students and the public and inform industry and policymakers how Aura will lead to a better understanding of the global environment.
URL: *http://science.hq.nasa.gov/missions/satellite_22.htm*
Activities: Explorer Institute [A401]
GLOBE Atmospheres Workshop [A65]

B4. Gravity Recovery And Climate Experiment

GRACE
Description: To learn more about the mysteries of gravity, twin satellites named GRACE~URL:*http://science.hq.nasa.gov/missions/satellite_19.htm*
Activities: Americorp Training [A39]
Austin Science Fun Day [A265]
GRACE: Bridge Point Elementary School Science Day [A283]
GRACE: Brykerwood Elementary School Science Day [A284]
GRACE: California Science Educator Conference [A67]
GRACE: Earth Science Week Career Fair [A285]
GRACE: High School Career Fair [A286]

GRACE: High School Design Challenge [A287]
GRACE: Minorities Introduction to Engineering [A288]
GRACE: NASA Space Education Workshop [A68]
GRACE: NASA Student Involvement Program [A289]
GRACE: National Science Teachers Association Workshop [A69]
GRACE: Santa Clarita Science Day [A290]
GRACE: Science Teacher Association of Texas [A70]
GRACE: Space Education Workshop [A71]
GRACE: Space Exploration Educators Conference [A72]
GRACE: Technology Preparation [A199]
GRACE: UT Explore [A407]
LiftOff Summer Institute [A85]
Texas School for the Blind and Visually Impaired (TSBVI) Educator Training [A164]

B5. Landsat Data Continuity Mission

LDCM

Description: As of December 23, 2005, the Landsat Data Continuity Mission (LDCM) strategy has been to acquire a single Landsat Data Continuity Mission in the form of a free-flying spacecraft. The Landsat Data Continuity Mission (LDCM) is the future of Landsat satellites. It will continue to obtain valuable data and imagery to be used in agriculture, education, business, science, and government. The Landsat Program provides repetitive acquisition of high-resolution multispectral data about Earth's surface on a global basis. The instrument aboard LDCM will collect land surface data consistent with data from the previous Landsat satellites. Landsat satellites have collected data about Earth's continental surfaces to support global change research and applications. These data constitute the longest continuous record of Earth's surface as seen from space. By imaging Earth's land environment at a resolution sufficient to record the impacts of human activities, Landsat provides an important complement to U.S. global imagers such as MODIS, MISR, and AVHRR.

Lead: Ms. Anita Davis, NASA Goddard Space Flight Center, Mail Stop 614.0, Greenbelt Road, Greenbelt, MD 20771-0001. Phone: 301-614-6669.

URL: *http://ldcm.nasa.gov/*

Activities: "Earth as Parks" Online Exhibit [A465]
Landsat Data Continuity Mission (LDCM): Student Internship [A293]
Landsat: Legacy Library Archives [A476]
Landsat: Teacher Workshops [A83]

B6. Nightglow

Description: The Nightglow mission is a collaboration among the NASA Goddard Space Flight Center, the University of Utah, and the New Mexico State University Particle Astrophysics Lab to measure the UV glow (nightglow) of Earth's atmosphere. The Nightglow instrument consists of three large-image telescopes instrumented with two large-image photomultiplier tubes (PMT). A PMT is a very sensitive device for converting light into an electronic signal. A filter is used to limit the light entering the telescopes to wavelengths between 300 and 400 nanometers-in the invisible, near-ultra-violet part of the spectrum. The large-image electronics are controlled by a small-format 386 microprocessor. One of the three main telescopes looks down at all times, while the other two rotate. The two telescopes that rotate view the ground, the horizon, and the UV glow at high altitudes (above the balloon at approximately 90 kilometers). This high-altitude nightglow comes from the excited states of the gases in the atmosphere, mainly nitrogen and oxygen.

Lead: Ms. Sandra Daly, Harvard-Smithsonian Center for Astrophysics, 60 Garden Street, Cambridge, MA 02138. E-mail: *sdaly@cfa.harvard.edu*. Phone: 617-496-4784.

Contact: Ms. Beth Barbier, NASA Goddard Space Flight Center, Greenbelt Road, Greenbelt, MD 20771-0001. E-mail: *beth@milkyway.gsfc.nasa.gov*. Phone: 301-286-7209.

URL: *http://nightglow.gsfc.nasa.gov/*

Activities: Nightglow: Remote Sensing Activities [A226]

B7. Quick Scatterometer

QuikSCAT

Description: The QuikSCAT mission is intended to record sea surface wind speed and direction data under all weather and cloud conditions over Earth's oceans. QuikSCAT operates in a near-polar orbit. It flies in a circular orbit at an altitude of approximately 800 kilometers (500 miles) above Earth's surface. It completes a full orbit in about 101 minutes, which translates to a little more than 14 orbits per day. SeaWinds is the main instrument on the QuikSCAT satellite. SeaWinds is an active radar scatterometer. This scatterometer operates by transmitting high-frequency microwave pulses to the ocean surface and measuring the echoed radar pulses bounced back to the satellite. The scatterometer estimates wind speed and direction over Earth's oceans at 10 meters above the surface of the water.

URL: *http://science.hq.nasa.gov/missions/satellite_51.htm*

Activities: Earth and Space Science Education Product Workshop [A54]

B8. Terra

Description: On February 24, 2000, Terra began collecting what will ultimately become a new, 15-year global data set on which to base scientific investigations about our complex home planet. The Terra satellite is the flagship of EOS.

It will provide global data on the state of the atmosphere, land, and oceans, as well as their interactions with solar radiation and with one another.
URL: *http://science.hq.nasa.gov/missions/satellite_52.htm*
Activities: Satellite Observations in Science Education [A231]

B9. Total Ozone Mapping Spectrometer/Earth Probe
TOMS/EP
Description: The Total Ozone Mapping Spectrometer, launched in July 1996 aboard an Earth Probe Satellite, continues NASA's long-term daily mapping of the global distribution of Earth's atmospheric ozone. TOMS/EP takes high-resolution measurements of the total column amount of ozone from space.
URL: *http://science.hq.nasa.gov/missions/satellite_27.htm*
Activities: Earth and Space Science Education Product Workshop [A54]

B10. Tropical Rainfall Measuring Mission
TRMM
Description: The Tropical Rainfall Measuring Mission (TRMM) is a NASA satellite that provides information both to test and to improve climate models. TRMM is particularly devoted to determining rainfall in Earth's tropics and subtropics. These regions make up about two-thirds of the total rainfall on Earth and are responsible for driving our weather and climate system. TRMM will contribute to a better understanding of where and how much the winds blow, where the clouds form and rain occurs, where floods and droughts will occur, and how the winds drive the ocean currents. TRMM will do this not just by providing rainfall data, but, more importantly, by providing information on heat released into the atmosphere as part of the process that leads to rain.
URL: *http://science.hq.nasa.gov/missions/satellite_28.htm*
Activities: Earth and Space Science Education Product Workshop [A54]

Earth Science Programs

B11. "Earth Observatory"
Description: The purpose of NASA's "Earth Observatory" is to provide a freely accessible publication on the Internet where the public can obtain new satellite imagery and scientific information about our home planet. The focus is on Earth's climate and environmental change. In particular, we hope our site is useful to public media and educators. Any and all materials published on "Earth Observatory" are freely available for re-publication or reuse, except where copyright is indicated.
URL: *http://earthobservatory.nasa.gov/*
Activities: "Earth Observatory" Web Site [A466]
Earth to Sky-An Innovative Partnership: NASA and the National Park Service [A383]

B12. Earth System Science Education Alliance
ESSEA
Description: From 2000 to 2005, colleges and universities across the United States have been offering online Earth System Science (ESS) courses for K–12 teachers through NASA's ESSEA program. The three available courses-for teachers of grades K–4, 5–8, and 9–12 are each 16 weeks long, are delivered completely over the Internet, and feature student-centered, knowledge-building virtual communities. The courses were developed for NASA within the Center for Educational Technologies (CET) at Wheeling Jesuit University; ESSEA is managed by the Institute for Global Environmental Strategies (IGES) and CET through funding from NASA. Between 2000 and 2005, over 1,500 teachers from 41 States have completed at least one of the three ESSEA courses through 20 participating colleges and universities. These diverse colleges and universities comprise six minority-serving institutions (including Historically Black Colleges and Universities and Hispanic-Serving Institutions); many ESSEA universities also serve rural and disadvantaged (e.g., high-poverty and urban) communities. ESSEA uses an instructional model that has proven effective and successful for K–12 science teacher education. This model addresses content and process, i.e., knowledge of Earth system science and the appropriate inquiry-based methods to teach it.
Lead: Ms. Theresa Schwerin, Institute for Global Environmental Strategies, 1600 Wilson Boulevard Suite 901, Arlington, VA 22209. E-mail: *theresa_schwerin@strategies.org*. Phone: 703-312-0825.
URL: *http://www.cet.edu/essea*
Activities: Alabama A&M Earth System Science Education Alliance (ESSEA): 5–8 Online Course [A167]

B13. Earth System Science Education for the 21st Century
ESSE 21
Description: ESSE 21, a leader in systemic change for interdisciplinary Earth system science education at the undergraduate level, emphasizes the understanding of Earth as a system of interrelated air, water, land, life, and social processes. Led by the Universities Space Research Association (USRA) and sponsored by NASA, ESSE 21 offers colleges and universities small, competitive grants to develop Earth system science courses, curricula, and degree programs. ESSE 21 engages a collaborative community of educators and scientists as partners in jointly developing and sharing courses and learning resources focused on Earth system science research and applications. ESSE 21 places special emphasis on reaching minority-serving institutions (MSIs). ESSE 21 participants stimulate their students' critical and creative thinking with Earth system models, research results, data, and visualizations available from NASA and the broader interdisciplinary community engaged in Earth system sci-

ence. These resources increase opportunities for teaching and learning about Earth as a system while developing competency in underlying STEM principles. Expanding Earth system science at our Nation's universities is critical to developing a workforce qualified to address our society's challenging Earth system and environmental problems while fostering a scientifically literate citizenry that can make informed decisions about these problems. ESSE 21 actively engages minority-serving institutions as community members and partners, providing a rich and supportive framework to explore and develop materials and courses that strive for educational excellence and meet specific minority institutional needs. ESSE 21 fosters deep and long-term relationships among research and education colleagues from around the country.

Lead: Dr. Donald Johnson, Universities Space Research Association, 10227 Wincopin Circle, Suite 212, Columbia, MD 21044-3498. E-mail: *donj@ssec.wisc.edu*. Phone: 608-262-2538.

Contact: Mr. Martin Ruzek, Universities Space Research Association, 8426 Polifka Road, Whitelaw, WI 54247. E-mail: *ruzek@usra.edu*. Phone: 920-732-3316.

URL: *http://esse21.usra.edu/ESSE21*

Activities: College and University Earth System Science Education Program [A133]

B14. Earth System Science Fellowship Program

Description: NASA's Earth System Science (ESS) Fellowship Program sponsors fellowships for students pursuing master of science or doctoral degrees in Earth system science and related disciplines. The program's purpose is to ensure continued training of interdisciplinary scientists to support the study of Earth as a system.

Lead: Dr. Ming-Ying Wei, NASA Headquarters Science Mission Directorate, Washington, DC 20546. E-mail: *ming-ying.wei-1@nasa.gov*. Phone: 202-358-0771.

URL: *http://science.hq.nasa.gov/education/catalog/programs/Programs49.html*

Activities: Earth System Science Fellowship Program [A8]

B15. Earth Observing System

EOS

Description: The Earth Observing System (EOS) is a major component of NASA's Earth-Sun System missions. The mission includes a series of satellites, a science component, and a data system supporting a coordinated series of polar-orbiting and low-inclination satellites for long-term global observations of the land surface, biosphere, solid Earth, atmosphere, and oceans. EOS is enabling an improved understanding of Earth as an integrated system. The EOS Project Science Office (EOSPSO) is committed to bringing program information and resources to both program scientists and the general public.

Lead: Dr. Ray Vandiver, Oregon Museum of Science and Industry, 1945 SE Water Ave, Portland, OR 97214-3354. E-mail: *rvandiver@omsi.edu*. Phone: 503-797-4540.

Contact: Dr. Ray Vandiver, Oregon Museum of Science and Industry, 1945 SE Water Ave, Portland, OR 97214-3354. E-mail: *rvandiver@omsi.edu.* Phone: 503-797-4540.

URL: *http://eospso.gsfc.nasa.gov/*

Activities: "Eyes on Earth": Traveling Exhibit Tour [A342]

B16. GeoBrain

Description: GeoBrain will mobilize NASA Earth Observing System (EOS) data and information through Web service and knowledge-management technologies for higher education teaching and research. The technologies, based on geo-object and geo-tree concepts, will be implemented in a Web information system that makes huge sets of NASA EOS data and information easily accessible to faculty and students. The system will allow users to dynamically and collaboratively develop interoperable, Web-executable geospatial service modules and models and to run them online against any part of the archived data in order to get back customized information products rather than raw data. George Mason University's Laboratory for Advanced Information Technology and Standards (LAITS) is conducting this innovative project.

URL: *http://geobrain.laits.gmu.edu*

Activities: NASA Earth Observing System (EOS) Higher Education Alliance: EOS Data and Information Services [A12]

B17. Global Learning and Observations to Benefit the Environment

GLOBE

Description: GLOBE (Global Learning and Observations to Benefit the Environment) is a worldwide, hands-on, primary and secondary school-based education and science program. GLOBE is an interagency program funded by the National Aeronautics and Space Administration (NASA) and the National Science Foundation (NSF), supported by the U.S. Department of State, and implemented through a cooperative agreement between NASA, the University Corporation for Atmospheric Research (UCAR) in Boulder, CO, and Colorado State University in Fort Collins, CO. GLOBE is a cooperative effort of schools in partnership with colleges and universities, State and local school systems, and nongovernmental organizations. Internationally, GLOBE is a partnership between the United States and over 100 countries who manage and support their unique national and regional program infrastructures and activities. The GLOBE Program Office (GPO) develops and supports the worldwide infrastructure for participating schools, scientists, and communities. The GPO staff includes experts in education, science, partnership development, customer service and information, Web site, and database technologies. NASA, NSF, and key members of UCAR and Colorado State University (CSU) management provide high-level policy guidance to the GPO. An external GLOBE international advisory committee (GIAC) is currently being constituted and will consist of leaders in education, science, industry, and public policy. The GIAC will provide advice on strategic international program directions such as helping schools/teachers/students to connect with cutting-edge science

projects, supporting collaborative student research on the environment, identifying regional or community-generated projects of highest priority to the GLOBE community, and suggesting strategies for program growth and long-term program sustainability. Activities at the GLOBE Program Office are guided by a framework document entitled "The Next Generation GLOBE" outlining the program's strategic goals and associated objectives.
Lead: Dr. Teresa Kennedy, University of Idaho, Moscow, ID 83844. E-mail: *tkennedy@uidaho.edu*. Phone: 208-885-7536.
URL: *http://www.globe.gov/*
Activities: GLOBE Contrail Team [A280]
GLOBE Workshops [A66]

B18. Immersive Earth
Description: Immersive Earth is a program to teach Earth science by creating immersive digital planetarium shows covering various aspects of Earth science. The project also has a technology component to create portable theaters to bring the Earth shows to schools and tribal locations around the country, not only at the large museums. Partner institutions include the Houston Museum of Natural Science, the Carnegie Museum of Natural History, the Oregon Museum of Science and Industry, the Lodestar Planetarium, and the Louisiana Arts and Science Museum. Corporate partners include E-Planetarium, Inc.; Home Run Pictures; Elumenati; Avela Corp.; Sky-skan; and IMove.
Lead: Dr. Patricia Reiff, Rice University, Physics and Astronomy, 6100 Main Street, Houston, TX 77251-1892. E-mail: *reiff@rice.edu*. Phone: 713-348-4634.
Contact: Dr. Kerry Handron, Carnegie Museum of Natural History, Earth Theater, Pittsburgh, PA 15213. E-mail: *HandronK@CarnegieMNH.Org*. Phone: 412-578-2580.
URL: *http://earth.rice.edu*
Activities: Earth Science Planetarium Shows [A341]
Immersive Earth: Conference Demonstrations [A79]
Immersive Earth: Demonstrations for Education Professionals [A80]
Immersive Earth: Public Outreach and Education [A413]
Immersive Earth: School Presentations [A292]
Immersive Earth: Web-Based Education [A475]
Magnetospheric MultiScale (MMS): Underserved Minority Student Presentations [A297]
Teacher Courses in Master of Science Teaching Program [A162]

B19. Measuring Vegetation Health
Description: Plants are like "green canaries"-if they die, then other organisms will likely follow. By measuring the health of plants, we are measuring the environmental conditions that affect all nearby organisms, including humans. Modern technologies let us monitor plant health using the proportions of light reflected from leaves. Combining these data with our understanding and observations of plant behavior and physiology helps us to quickly assess the quality of the local environment. "Measuring Vegetation Health" brings together biology, physics, chemistry, technology, art, engineering, and math in a project that predominantly supports field studies in middle to high school and self-guided education in environmental science. Many tools such as free software and ideas for activities and student challenge questions are provided on this Web site.
Activities: "Measuring Vegetation Health": Courses [A221]
"Measuring Vegetation Health": Educator Workshops [A91]
"Measuring Vegetation Health": Exhibits and Programs [A479]

B20. Mentoring and inquiry using NASA Data on Atmospheric and Earth science for Teachers and Amateurs
MY NASA DATA
Description: Our team is dedicated to making NASA Earth science data easily accessible to the K–12 and citizen-scientist communities. Mentoring and inquiry using NASA Data for Atmospheric and Earth science for Teachers and Amateurs (MY NASA DATA) is a project to enable K–12 teachers and students, as well as citizen-scientists, to explore the large volumes of data that NASA collects about Earth from space. Students use scientific inquiry and math skills as they access and display microsets of the Earth system. A microset is a small amount of data-perhaps a single parameter for the whole globe or a time series for a single location-extracted from a much larger data file. It is in a simple format, such as plain text, or accessible through a user-friendly tool. MY NASA DATA microsets are primarily made from data holdings of the Atmospheric Science Data Center (ASDC) at NASA Langley Research Center in Hampton, VA, and other sources. While the primary focus of these data is Earth's atmosphere, some information on Earth's surface and land cover is also available. Most of the data are global, at a typical resolution of 1° in latitude and longitude. Microsets are NOT high-resolution images.
Lead: Dr. Lin Chambers, NASA Langley Research Center, MS 420, Hampton, VA 23681. E-mail: *l.h.chambers@larc.nasa.gov*. Phone: 757-864-4371.
URL: *http://mynasadata.larc.nasa.gov*
Activities: MY NASA DATA [A222]

B21. New York City Research Initiative
NYCRI
Description: The New York City Research Initiative (NYCRI) is sponsored by the NASA Education Office. Currently, 30 NYCRI research teams are assigned to 12 colleges in the New York City metropolitan area and at the NASA Goddard Institute for Space Studies (GISS). Summer Research Institute Component: Teams of high school and under-

graduate students and faculty work alongside graduate students and the Principal Investigators (lead scientists) of NASA-funded research projects at universities within a 50-mile radius of New York City (in New York, New Jersey, and Connecticut) or at GISS under the mentorship of a GISS scientist. Summer enrichment experiences include content and research seminars; team oral research reports; visits to various research laboratories and informal education institutions; participation in local and national research conferences; and a final research summit with participants from other government agencies, such as the National Science Foundation (NSF), National Oceanic and Atmospheric Administration (NOAA), the United States Department of Education (USDE), and the United States Department of Defense (DOD). Academic Year Component: NYCRI high school and college faculty formulate and implement NASA research-based learning units in existing science, technology, engineering, and mathematics (STEM) courses. NASA, NSF, and university partners offer content, research, and teacher preparation/enhancement seminars. Informal education seminars are provided by institutions such as the American Museum of Natural History, the Hayden Planetarium, the Intrepid Air and Space Museum, the Wildlife Conservatory Society (WCS) at the Bronx Zoological Park, and Brookhaven National Laboratories and various science centers, as well as by NASA aerospace and other education specialists.

Activities: New York City Research Initiative (NYCRI): 2005 Summer Research Institute [A23]
New York City Research Initiative (NYCRI): Academic Year Component [A24]
New York City Research Initiative (NYCRI): Enrichment Experience at the Hayden Planetarium [A25]
New York City Research Initiative (NYCRI): Final Research Conference [A26]

B22. Odyssey of the Mind

OM

Description: Odyssey of the Mind (OM) is an international educational program that provides creative problem-solving opportunities for students from kindergarten through college. Kids apply their creativity to solve problems that range from building mechanical devices to presenting their own interpretation of literary classics. They then bring their solutions to competition on the local, State, and world levels. Thousands of teams from throughout the United States and from about 25 other countries participate in the program. NASA's EOS Project Science Office has been a sponsor of OM since 1999.

Activities: Odyssey of the Mind [A310]

B23. Satellite Observations in Science Education

Description: The purpose of this program is to develop an Internet-based education environment that provides interactive learning activities teaching remote sensing principles and exploratory data analysis. A major goal for this project is to build a toolkit of Reusable Content Objects, or RCOs, and Reusable Evaluation Objects, or REOs.

URL: *http://www.ssec.wisc.edu/sose/*

Activities: Satellite Observations in Science Education [A231]

B24. Students' Cloud Observations On-Line

S'COOL

Description: S'COOL-Students' Cloud Observations On-Line-is a project that involves school children in real science. They provide ground truth measurements to assist in the validation of the Clouds and the Earth's Radiant Energy System (CERES) instrument. They can also compare the surface- and space-based observations to learn more about clouds and climate. S'COOL is a joint project of the Atmospheric Science Competency, the Atmospheric Science Data Center (ASDC), and the Office of Education at NASA Langley Research Center.

URL: *http://asd-www.larc.nasa.gov/SCOOL/groundtruth.html*

Activities: Students' Cloud Observations On-Line (S'COOL) [A318]

B25. Virtual Interactive Environmental Worlds

3D-VIEW

Description: An exciting, interactive, science and technology classroom-based initiative with professional development, Project 3D-VIEW (Virtual Interactive Environmental Worlds) engages students in Earth science and Earth system science with immersive 3-D views. The program combines NASA mission data with 3-D technologies in grades 5 and 6 as students become "explorers" while working in five units: "Lithosphere," "Hydrosphere," "Biosphere," "Atmosphere," and "Earth Systems." A goal of the project is for students to understand Earth system science topics and courses and science-based decisionmaking in high school and beyond. Using simple Web interfaces and a custom viewer, students explore, create, manipulate, and navigate 3-D stereo views. 3D-VIEW is aimed at increasing student achievement in middle school science by using 3-D technology to help students to fully understand abstract concepts.

Lead: Mr. Glen Schuster, U.S. Satellite Laboratory, Rye, NY 10580. E-mail: *gschuster@us-satellite.net*. Phone: 914-921-5920.

Contact: Ms. Meghan Marrero, U.S. Satellite Laboratory, Rye, NY 10580. E-mail: *mmarrero@signalsofspring.net*. Phone: 914-921-5920.

URL: *http://www.3dview.org*

Activities: 3D-VIEW [A168]
3D-VIEW (Virtual Interactive Environmental Worlds): Student Involvement [A262]
3D-VIEW: Formal Research/Evaluation [A169]

Grants Programs

B26. Initiative to Develop Education through Astronomy and Space Science

IDEAS

Description: The IDEAS grant program is administered by the Space Telescope Science Institute (STScI) on behalf of NASA's SMD. As part of the overall E/PO program, the IDEAS grant program provides startup funding for innovative, creative education and public outreach projects that feature active collaboration between astronomers/space scientists and formal education/informal education professionals. Through this effort, the IDEAS objective is to enhance science, mathematics, and/or technology education in the United States for K–14 students, teachers, and the general public by promoting partnerships that explore new ways to translate astronomy and space science into contexts that will educate and stimulate the interest of people in those groups. There is a formal panel review of all accepted IDEAS grant program proposals. Each team provides an assessment of the group of proposals assigned as well as recommendations for funding. Based on the team's information, the allocation committee at STScI makes final awards. For IDEAS 2001, the program drew 53 proposal submissions from 25 States and 1 U.S. territory. Thirteen proposals were accepted for funding. A two-phased retrospective of the IDEAS grant program took place between July 2002 and September 2003. In Phase 1, an external panel concluded that the processes used by the IDEAS grant program were designed to be effective and efficient and that IDEAS had evolved to become a national model. The panel also reaffirmed that the IDEAS grant program played a role within the context of NASA space and Earth science E/PO goals and objectives. Furthermore, the panel agreed that IDEAS was useful as a test bed for innovative projects that fall outside other NASA science-driven education and public outreach funding opportunities.

Lead: Ms. Bonnie Eisenhamer, Space Telescope Science Institute, Office of Public Outreach, 3700 San Martin Drive, Baltimore, MD 21218. E-mail: *bonnie@stsci.edu*. Phone: 410-338-4798.

URL: *http://ideas.stsci.edu/*

Activities: Exploring Our Solar Neighborhood [A57]
K–4 Math and Astronomy Through Hands-On Projects [A216]
Quasars and Supermassive Black Holes [A484]
SOAR: Student Opportunities with Astronomy Resources [A235]
Space Vision [A110]
The Dragon Ate What? From Dragons to Eclipses: Improving Girl Scouts' Appreciation of Astronomy [A500]
Workshops, Sessions, and Seminars for Scientists and E/PO Leads on K–14 Education and Public Outreach [A520]

B27. Minority Institution Initiative

MI Initiative

Description: The Science Mission Directorate and Office of Education Minority University Education and Research Partnership Initiative in Space Science is a grant program with the long-term goals of enhancing minority college and university participation in space science and increasing the understanding of science, technology, and the role of research in contemporary society in a broad and diverse segment of the American population. It emphasizes partnerships among SMD, the space science research community, and minority institutions. During FY 2003, 15 projects were funded under this initiative, including 6 at HBCUs, 3 at HSIs, 3 at TCUs, and 3 at other minority institutions. Collectively, they were engaged in research collaborations with 10 NASA space science missions or suborbital projects and more than 50 working partnerships with major space science research groups. In academic programs, they established on their campuses 25 new or redirected space science faculty positions, 11 new or revised space science degree programs, and 67 new or revised space science courses. They also engaged in a wide variety of teacher training, precollege outreach, and public outreach programs that serve constituencies in their local communities.

Lead: Dr. Larry Cooper, Ohio Aerospace Institute, 22800 Cedar Point Road, Cleveland, OH 44142.

Activities: A Space Science Outreach Program Directed Toward Underrepresented Groups [A387]
Employing Planetary Astronomy to Inspire Undergraduates in Southern California's Inland Empire [A14]
Graduate Space Science Education and Disturbed Solar Wind Effects on Earth's Environment [A17]
Initiative to Enhance Space Science Education and Research at Norfolk State University [A18]
Magnetospheric MultiScale (MMS): Underserved Minority Student Presentations [A297]
New Directions in Astronomy and Astrobiology [A22]
New York City Space Science Research Alliance-Phase II [A27]
Partnership for a Sustainable Space Science Program at the University of the District of Columbia in Collaboration with the Catholic University of America [A28]
Partnerships in Astronomy and Astrophysics Education and Research at Southern University [A29]
Space Science Minor at Hampton University [A30]
Synergetic Education and Research for Equipping NASA Space Scientists and Engineers [A34]
Teacher Courses in Master of Science Teaching Program [A162]
Toward a Comprehensive Space Science Program at Fisk University: Curriculum Development, Research Partnerships, and Outreach Activities [A35]
Workshop on Topics in Modern Astronomy [A128]

B28. Supporting Research and Technology

SRT

Description: The NASA SMD SRT Program provides grants for basic research, instrument development, and data analysis for Earth and space science missions. Each grantee also has the opportunity to propose a supplementary E/PO project to be conducted in conjunction with the research project. The outcomes of the funded E/PO projects are reported here.

Lead: Dr. Larry Cooper, NASA Headquarters Science Mission Directorate, NASA Headquarters, Washington, DC 20546. E-mail: *Larry.P.Cooper@nasa.gov*. Phone: 202-358-1531.

URL: *http://spacescience.nasa.gov/education/scientists/index.htm*

Activities:
A Regional Center of Excellence in Astronomy Education [A36]
"Ask a Physicist" [A450]
"Ask an Astrophysicist" [A451]
Asteroids Arrive in the Classroom [A41]
Auroral Structure and Dynamics [A171]
"Beginnings: Stars, Planets, and Life" [A457]
Bringing the Multiwavelength Milky Way to the Classroom: An Inquiry-Based Program [A172]
Caution: Asteroids Ahead: Understanding Near-Earth Objects and the Hazards They Might Pose to Earth [A173]
Developing a District-Wide Elementary-University Space Science Education Partnership [A135]
Developing New High School Hands-On and Computer-Based Curricular Modules on the Nature of Comets, Dust in the Solar System, the Kuiper Belt, and the Oort Cloud [A185]
Discovering the Unseen with Ultraviolet Light [A340]
Education and Public Outreach to Rural Areas [A467]
Essex-Stevens Model: Access to Space Science Research Opportunities [A15]
Exploration of the Solar System: A New View of Jupiter [A137]
Exploring Astrobiology: A Penn State-University of Puerto Rico Initiative [A16]
Exploring Icy Worlds [A56]
"Exploring the Planets: A Tour of Other Worlds" [A194]
Future Astronomy: The Infrared Universe [A60]
Graduate Student Researchers Program (GSRP) [A9]
Hands-On Astronomy for Elementary and Middle School Teachers in Rural North Carolina [A73]
How Good Is "Good Enough?": Engineering and Other Tradeoffs and Remote Sensing Data [A345]
Imaging Neptune [A138]
In-Class Multimedia Programs in Support of the Space Weather Planetarium Show [A214]
Lunar and Planetary Institute (LPI): Educator Field Experiences [A143]
Meteorite Museum Renovation and Associated Outreach Activities at the University of New Mexico [A361]
National Center for Atmospheric Research (NCAR) High-Altitude Observatory: Teachers-in-Residence Program for K–12 Outreach [A149]
New Investigator Program (NIP) in Earth Science [A4]
Project Spectra: Exploring Planets and Their Atmospheres Using Spectroscopy [A230]
Public Outreach and Education with Meteorites Involving a Museum Exhibit [A368]
Radio, Print, and Internet Educational Outreach for NASA-Sponsored Research on Model Atmospheres and Chemical Evolution [A485]
Sagan/Haskin Fellowships [A5]
Science Education Gateway/National Virtual Observatory [A487]
Searching for Life in an Antarctic Lake Without Leaving Chicago [A369]
Seeing, Measuring, and Researching the Turbulent Sun (SMARTS) [A314]
Solar System Impacts: A Suite of Computer-Generated Visualizations [A372]
Solar System Radio Explorer Kiosk [A373]
Space Sciences for the "Physics First" Curriculum [A246]
Space Weather and Its Effects on Earth and Jupiter [A374]
Space Weather Sounds Scavenger Hunt (SWSSH) [A247]
Spitzer Space Telescope: Workshops and Activities for K–12 Teachers [A112]
StarDate Guide to the Solar System [A493]
StarDate/Universo Radio Programs on Magnetic Fields and Exploding Stars [A494]
"Stardust, Supernovae, and Earth . . . Oh My!" [A159]
Stellar Mysteries, Stellar Detectives [A249]
Student Nitric Oxide Explorer Guest Investigator: Modeling and Observations of Solar Influences on Thermospheric Nitric Oxide [A252]
Study of Variable Stars as a Pathway to Teaching Physical Science for Middle and High School Teachers [A160]
Sun-Earth Connection: Presentation and Inquiry Resources for Scientists in K–12 Classrooms [A498]
Teacher Training Through Research and Public Understanding of Cosmology [A119]
Telescience in Museums: Linking Learners to a Life-Seeking Desert Rover [A375]
"The Aliens Answer!" A Full-Dome Exobiology Theater Show [A376]
"What Are Astronomers Doing?" An Internet and Interactive Museum Kiosk for Educational Outreach [A377]
"What's New on the Outer Planets?" [A505]
White Dwarfs and the Age of Our Galaxy: A Professional Development Experience for Teachers [A127]
"Windows to the Universe" [A260]

Workshop on Topics in Modern Astronomy [A128]
Wyoming Space Camp [A332]

Major Partnerships

B29. Adler Center for Space Science Education

Description: The Center for Space Science Education at the Adler Planetarium and Astronomy Museum serves as a nexus between the research and education communities. Its goal is to bring a broad program of astronomy and space science education to the half-million annual visitors to the museum and reach beyond the traditional museum setting to provide educational support for students, teachers, and families.
URL: *http://www.adlerplanetarium.org*
Activities: "Secrets of Saturn" Sky Show [A370]

B30. Space Science Outreach Activities

Description: In keeping with our education outreach goal of "enhancing the quality of education," SMD participates in a number of educational and outreach activities at both the regional and national levels. SMD supports a number of regional and national education conferences attended by thousands of educators in math, science, and technology. SMD supports various professional conferences attended by thousands of scientists from all fields of space science. The activities at these conferences usually entail showcasing an exhibit, distributing educational and outreach material (litho sets, posters, educator guides, strategic plans, etc.), conducting educational workshops, giving keynote speeches, highlighting various space science Web sites, and having NASA employees and scientists answer questions about space science. Finally, SMD staff members participate in more localized events such as conducting talks in local classrooms.
Lead: Ms. Ruth Netting, NASA Headquarters Science Mission Directorate, NASA SMD, Washington, DC 20546.
E-mail: *rnetting@hq.nasa.gov*. Phone: 202-358-0539.
URL: *http://spacescience.nasa.gov/education*
Activities: Solar System Ambassadors (SSA) Program [A385]
Solar System Ambassadors Training [A381]

B31. Science Center Development

Description: In keeping with our public outreach goal of "sharing the excitement of space science discoveries with the public," NASA supports a number of major development projects at science centers and planetariums across the country. Such projects typically entail the development or renovation of exhibit galleries or planetariums, coupled with the development of new exhibits, shows, and education programs based on the results of recent NASA space science missions and discoveries. These efforts make a substantial contribution to the general public's understanding of science and to communicating to students and the public the new understanding of the universe derived from NASA's space science program.
Lead: Dr. Larry Cooper, NASA Headquarters Science Mission Directorate, Washington, DC 20546.
E-mail: *Larry.P.Cooper@nasa.gov*. Phone: 202-358-1531.
URL: *http://spacescience.nasa.gov/education*
Activities: Observatory and Planetarium Theater Project [A367]

B32. Passport to Knowledge

P2K
Description: Passport to Knowledge (P2K) is an ongoing series of interactive learning adventures: its mission is to inform and excite young people about basic scientific principles by sharing with them the people, places, and processes of contemporary research. Supported by grants from NASA, the National Science Foundation, NOAA, and other public and private resources, P2K has, since 1993, developed and distributed nearly 100 hours of original science programming via public and NASA TV. "Live From" specials have originated from the South Pole, the Amazon rainforest, and many NASA Centers. Space-related miniseries such as "Live from the Hubble Space Telescope" have included technical and educational firsts, such as the first allocation of actual HST observing orbits to K–12 education. Passport to Knowledge, however, is much more than TV programs: P2K uses an integrated suite of video programs, hands-on activities, and online resources to deliver real science, real scientists, real locations, and real learning. From 1998 through the present, P2K has reformatted the original live specials into customized learning modules, once again including videos, Web sites, and hands-on activities. Projects such as Passport To The Solar System (PTSS) and Science Concepts in Context (SCiC) use comments from NASA scientists and examples from all of the NASA Mission Directorates to place core science concepts in a real-world context. In 2002, P2K added a major grant from NSF's informal science education program to its continuing NASA support to begin the ongoing "To Mars with MER" series (TMwM), which follows the efforts of the MER mission to design, build, launch, fly, and successfully land the twin MER spacecraft on the Red Planet. TMwM features personal stories of the unusually diverse group of men and women behind the mission, which will excite all young Americans, especially those in inner cities and remote rural communities.
Lead: Mr. Geoffrey Haines-Stiles, Passport to Knowledge (P2K), 27 Washington Valley Road, Morristown, NJ 07960.
E-mail: *ghs@passporttoknowledge.com*. Phone: 973-656–9403.
URL: *http://passporttoknowledge.com*
Activities: "Passport To The Solar System" (PTSS) [A228]
"Science Concepts in Context" [A233]
"To Mars with MER" [A501]

SPACE SCIENCE EDUCATION AND PUBLIC OUTREACH (E/PO) SUPPORT NETWORK

Forums

B33. Astronomical Search for Origins Forum

ASO

Description: The Origins program is the scientific study of the long chain of events involved in the formation of the universe, from the birth of the universe in the Big Bang, to the formation of galaxies, stars, planets, and the chemical elements of life, to the profusion of life on Earth and possibly elsewhere. The overarching program funded by NASA that enables researchers to pursue these questions is called Astronomical Search for Origins and Planetary Systems, or Origins for short. The ASO Forum is the public gateway to the research results, other data and information, and the people behind this quest.

Lead: Dr. Denise Smith, Space Telescope Science Institute, Office of Public Outreach, 3700 San Martin Drive, Baltimore, MD 21218. E-mail: *dsmith@stsci.edu*. Phone: 410-338-4434.

URL: *http://origins.stsci.edu/*

Activities: Development of GEMS Space Science Core Sequence Curriculum [A186]
"Exceptional Space Science Materials for Exceptional Students" Workshop [A192]
Followup to Chicago 2004: A Workshop to Foster Broader Participation in NASA Space Science Missions and Research Programs [A508]
Mid-Atlantic Planetarium Society (MAPS) Annual Conference [A421]
NASA Preservice Teacher Conference [A94]
Origins Education Forum Evaluation Service [A227]
Origins Education Forum: Workshops/Presentations [A100]
Preservice Educator Poster Presentation [A516]
Space Science Education Resource Directory [A244]
Special Needs Resource Group [A248]
Special-Needs Initiative [A32]
Sun-Earth Day-Ancient Observatories [A440]
Tactile and Technology Focus Group [A257]
Workshops, Sessions, and Seminars for Scientists and E/PO Leads on K–4 Education and Public Outreach [A520]

B34. Solar System Exploration Forum

SSE

Description: NASA's SSE Forum serves as the entry point and coordinator for E/PO activities and materials related to NASA's Solar System Exploration missions and research activities. Our content includes the planets beyond Earth, comets, asteroids, other planetary bodies, and moons.

Lead: Ms. Leslie Lowes, NASA Jet Propulsion Laboratory, 4800 Oak Grove Drive, Pasadena, CA 91109. E-mail: *Leslie.L.Lowes@jpl.nasa.gov*. Phone: 818-393-7734.

Contact: Dr. Ellis Miner, NASA Jet Propulsion Laboratory, MS 183-301, 4800 Oak Grove Drive, Pasadena, CA 91109. E-mail: *Ellis.D.Miner@jpl.nasa.gov*. Phone: 818-354-4450.

URL: *http://sseforum.jpl.nasa.gov*

Activities: Development of GEMS Space Science Core Sequence Curriculum [A186]
"Exceptional Space Science Materials for Exceptional Students" Workshop [A192]
Followup to Chicago 2004: A Workshop to Foster Broader Participation in NASA Space Science Missions and Research Programs [A508]
Girl Scouts of the USA (GSUSA)-NASA Collaboration [A470]
"MarsQuest" Planetarium Show [A359]
Mid-Atlantic Planetarium Society (MAPS) Annual Conference [A421]
Space Science Education Resource Directory [A244]
Space Science Workshops for Educators [A109]
Special-Needs Initiative [A32]
Sun-Earth Day-Ancient Observatories-Timeless Knowledge [A440]
Workshops, Sessions, and Seminars for Scientists and E/PO Leads on K–14 Education and Public Outreach [A520]

B35. Structure and Evolution of the Universe Forum

SEU

Description: The SEU Forum shares the exciting discoveries and knowledge from NASA's SEU missions and research programs with educators, students, and the general public. The SEU partnership brings together the rich expertise of scientists, science educators, and education researchers to develop innovative products and programs. Our goal is to contribute to the improvement of precollege science education and increase science literacy at all levels, focusing attention on the human quest to understand the universe and our place in the cosmos.

Lead: Dr. Roy Gould, Harvard-Smithsonian Center for Astrophysics, MS 71, 60 Garden Street, Cambridge, MA 02138. E-mail: *rgould@cfa.harvard.edu*. Phone: 617-496-7689.

Contact: Ms. Mary Dussault, Harvard-Smithsonian Center for Astrophysics, MS 71, 60 Garden Street, Cambridge, MA 02138. E-mail: *mdussault@cfa.harvard.edu*. Phone: 617-496-7962.

URL: *http://cfa-www.harvard.edu/seuforum/*

Activities: Astronomy and Space Science Concept Assessment Project [A170]
Chandra E/PO Grant: After-School Astronomy Project [A378]
"Cosmic Questions" Professional Development [A50]
"Cosmic Questions: Our Place in Space and Time" Traveling Exhibition [A337]
"Cosmic Questions": Public Outreach Events [A396]
"Exceptional Space Science Materials for Exceptional Students" Workshop [A192]
Expanding the Universe in the Classroom: Professional Development DVD [A55]
Followup to Chicago 2004: A Workshop to Foster Broader Participation in NASA Space Science Missions and Research Programs [A508]
"Inside Einstein's Universe": Education Outreach Program [A356]
MicroObservatory Online Telescopes [A305]
Mid-Atlantic Planetarium Society (MAPS) Annual Conference [A421]
SEU Forum: Mission Support [A518]
"SEU: Modeling the Universe Workshop": An Exploration of Space and Time [A105]
Space Science Education Resource Directory [A244]
Space Science for Amateur Astronomers [A491]
Space Science Workshops for Educators [A109]
Special-Needs Initiative [A32]
Sun-Earth Day-Ancient Observatories-Timeless Knowledge [A440]
Tactile and Technology Focus Group [A257]
Workshops, Sessions, and Seminars for Scientists and E/PO Leads on K–14 Education and Public Outreach [A520]
"You Are Here: Exploring Your Universe from Inner to Outer Space" [A261]

B36. Sun-Earth Connection Education Forum

SECEF

Description: The Sun-Earth Connection Forum shares the exciting discoveries and knowledge from NASA's SEC missions and research programs with educators, students, and the general public. The SEC partnership brings together the rich expertise of scientists, educators, and museum personnel to develop innovative products and programs. Our goal is to contribute to the improvement of precollege science education and increase science literacy at all levels, focusing attention on the active Sun and its effects on Earth.

Lead: Dr. James Thieman, NASA Goddard Space Flight Center, Greenbelt Road, Greenbelt, MD 20771-0001. E-mail: *thieman@nssdc.gsfc.nasa.gov*. Phone: 301-286–9790.

Contact: Dr. Isabel Hawkins, University of California, Berkeley, MC 7450, Berkeley, CA 94720. E-mail: *isabelh@ssl.berkeley.edu*. Phone: 510-643-5662.

URL: *http://sunearth.gsfc.nasa.gov*

Activities: Development of GEMS Space Science Core Sequence Curriculum [A186]
Earth to Sky-An Innovative Partnership: NASA and the National Park Service [A383]
"Exceptional Space Science Materials for Exceptional Students" Workshop [A192]
Expanding Your Horizons: Outreach to Girls in Science [A468]
Followup to Chicago 2004: A Workshop to Foster Broader Participation in NASA Space Science Missions and Research Programs [A508]
IMAGE: "Ancient Observatories: Timeless Knowledge" [A77]
IMAGE: Teacher Workshops and Conferences [A78]
IMAGE: Webcast [A412]
Mid-Atlantic Planetarium Society (MAPS) Annual Conference [A421]
NASA Preservice Teacher Conference [A94]
Reuven Ramaty High Energy Solar Spectroscopic Imager (RHESSI): Teacher Professional Development [A103]
RHESSI: Public Outreach and Informal Education [A424]
Solar Week [A240]
Space Science Education Resource Directory [A244]
Special Needs Resource Group [A248]
Special-Needs Initiative [A32]
STEREO In-situ Measurements of Particles And CME Transients (IMPACT): Curriculum Development and Dissemination [A114]
STEREO: Teacher Professional Development [A115]
Student Observation Network: Tracking a Solar Storm [A253]
Sun-Earth Connection Education and Public Outreach Electronic Newsletter [A497]
Sun-Earth Connection Education Forum (SECEF): Educator Conference Support [A116]
Sun-Earth Connection Education Forum (SECEF): Formal Education Student Support [A319]
Sun-Earth Connection Education Forum (SECEF): Informal and Public Outreach [A439]
Sun-Earth Connection Education Forum (SECEF): Preservice Teacher Education [A117]
Sun-Earth Connection Education Forum (SECEF): Professional Development-Sharing Sun-Earth Connections with Inservice Teachers [A118]
Sun-Earth Connection Education Forum (SECEF): Targeted Outreach to Native Americans [A519]
Sun-Earth Day-Ancient Observatories-Timeless Knowledge [A440]
Workshops, Sessions, and Seminars for Scientists and E/PO Leads on K–14 Education and Public Outreach [A520]
"You Are Here: Exploring Your Universe from Inner to Outer Space" [A261]

Broker/Facilitators

B37. DePaul University Broker/Facilitator

DePaul B/F

Description: The DePaul B/F assists space scientists and members of the education community in the States of Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, and Wisconsin to form partnerships that realize high-leverage opportunities for education and outreach.

Lead: Dr. Carolyn Narasimhan, DePaul University, 1 East Jackson St., Chicago, IL 60604. E-mail: *cnarasim@depaul.edu*. Phone: 773-325-1854.

URL: *http://analyzer.depaul.edu/NASABroker/*

Activities:
Chicago Teachers' Advisory [A132]
DePaul Broker/Facilitator: "SPACEBUZZ" Electronic Newsletter [A183]
"Exceptional Space Science Materials for Exceptional Students" Workshop [A192]
Expanding the Universe in the Classroom: Professional Development DVD [A55]
Followup to Chicago 2004: A Workshop to Foster Broader Participation in NASA Space Science Missions and Research Programs [A508]
Midwestern Science Teachers Meetings [A93]
Outreach to Native Americans in the Western Region [A102]
"SEU: Modeling the Universe Workshop": An Exploration of Space and Time [A105]
Space Science for Amateur Astronomers [A491]
Space Science for Midwest Planetariums [A382]
Space Science for the Blind and Visually Impaired [A316]
Space Science Workshops for Minority-Serving Institutions [A31]
Special-Needs Initiative [A32]
Tactile and Technology Focus Group [A257]
Wisconsin Earth and Space Science Network [A166]

B38. South Central Organization of Researchers and Educators

SCORE

Description: The Lunar and Planetary Institute (LPI) provides a bridge between NASA's solar system scientific missions and the academic community. Through LPI, visiting and staff scientists participate in studies of the current state, evolution, and formation of our solar system. Resources at the LPI include a computing center, library, collections of lunar and planetary data, an image-processing facility, and publishing and conference services. The E/PO department focuses on providing access to current findings about our solar system through a variety of programs for the formal and informal education realms. Examples include programs designed to bring space science activities and resources into public and school library settings; planetarium programs exploring space science through Native American legends; educator workshops sharing current solar system research; hands-on classroom activities developed in collaboration with staff scientists; and public outreach events geared toward young children, families, and older students/adults.

Lead: Dr. Stephanie Shipp, Lunar and Planetary Institute, 3600 Bay Area Boulevard, Houston, TX 77058-1113. E-mail: *shipp@lpi.usra.edu*. Phone: 281–486-2109.

URL: *http://www.lpi.usra.edu/education/score/*

Activities:
Community Workshops-Topics in Space Science Education [A462]
South Central Organization of Researchers and Educators (SCORE): State Science Teachers Conferences [A108]

B39. Mid-Atlantic Region Space Science Broker/Facilitator

MARSSB

Description: MARSSB serves as Broker/Facilitator for the following nine States, plus the District of Columbia: West Virginia, Pennsylvania, New York, Delaware, New Jersey, Maryland, Virginia, Kentucky, and Ohio. MARSSB employs three themes to fulfill its role as a Broker/Facilitator: Systemic Reform Through New Strategies, Technology Integration, and Diversity. The Systemic Reform Through New Strategies theme will be addressed by offering online E/PO resources and by developing collaborations with existing systemic reform initiatives. One of the online resources, the Virtual Design Center (VDC), provides a NASA resource for stimulating the development of research-based instructional technology to support classroom activities. The VDC also disseminates new knowledge about how learning theories can be applied to instructional technology and classroom environments. The goal of increasing diversity in space science research and education will be addressed by developing an ongoing dialog and collaboration with MU-SPIN, HBCUs, HSIs, and minority initiatives of the NASA space science support network. The Technology Integration theme is addressed within the context of the Space Science Educational Activities and Training Sites (SSEATS). SSEATS establishes a network of host institutions that offer resources and workshop opportunities to preservice and inservice educators based on SMD missions and facilities, standards-based curriculum materials, and links to other NASA education programs.

Lead: Dr. Laurie Ruberg, Center for Educational Technologies, 316 Washinigton Avenue, Wheeling, WV 26003. E-mail: *lruberg@cet.edu*. Phone: 304-243-2480.

URL: *http://marssb.cet.edu/*

Activities:
Broker Services Poster Presentation [A506]
Challenger Learning Center Space Camp [A268]

"Exceptional Space Science Materials for Exceptional Students" Workshop [A192]
Followup to Chicago 2004: A Workshop to Foster Broader Participation in NASA Space Science Missions and Research Programs [A508]
MARSSB: NASA Explorer Institute [A511]
Maryland Science Center SpaceLink Teachers' Thursdays [A90]
Mid-Atlantic Planetarium Society (MAPS) Annual Conference [A421]
NASA Balloon Science Workshop [A20]
NASA Preservice Teacher Conference [A94]
Preservice Educator Poster Presentation [A516]
Sally Ride Science Festival [A313]
Special-Needs Initiative [A32]
Sun-Earth Day Workshop [A161]
Testing Ideas About Light [A120]
West Virginia Eastern Panhandle Regional Science Fair [A329]
Workshops, Sessions, and Seminars for Scientists and E/PO Leads on K–14 Education and Public Outreach [A520]

B40. New England Space Science Initiative in Education Broker/Facilitator

NESSIE B/F

Description: Founded in January 2002, NESSIE is the Broker/Facilitator for the New England states of Connecticut, Rhode Island, Massachusetts, Vermont, New Hampshire, and Maine. NESSIE is charged with catalyzing and fostering collaborations among space scientists and educators within both the formal and informal education communities. NESSIE itself is a collaboration of scientists and science educators at the Museum of Science in Boston, the Harvard-Smithsonian Center for Astrophysics, and Tufts University. Its primary goals are to (1) broker partnerships among space scientists and educators, (2) facilitate a wide range of educational and public outreach activities, and (3) examine and improve space science education methods. NESSIE's unique strengths reside in its prime location (the Museum of Science), its diverse mix of scientists and educators, and its dedicated board of advisers. NESSIE's role as a clearinghouse and facilitator of space science education is being realized through its interactive Web site and via targeted meetings, workshops, and conferences involving scientists and educators. Special efforts are being made to reach underserved groups by tailoring programs to their particular educational needs and interests. These efforts are building on the experiences of prior and ongoing programs in space science education at the Museum of Science, the Harvard-Smithsonian Center for Astrophysics, Tufts University, and NASA.

Lead: Dr. Cary Sneider, Museum of Science, NESSIE, Boston, MA 02114-1099. E-mail: *nessie@mos.org*. Phone: 617-589-0227.

Contact: Dr. William Waller, Museum of Science, Education Programs-Boston, MA 02114-1099. E-mail: wwaller@mos.org. Phone: 617-589-0227.

URL: http://www.mos.org/nessie

Activities: Cosmos in the Classroom 2004-Resource Book [A11]
"Countdown to Supernova" Planetarium Show [A338]
Current Science and Technology Center [A339]
"Exceptional Space Science Materials for Exceptional Students" Workshop [A192]
"Folio of Information for New England Space Scientists in Education (FINESSE)" [A507]
Followup to Chicago 2004: A Workshop to Foster Broader Participation in NASA Space Science Missions and Research Programs [A508]
"Gravity Rules!" Planetarium Show [A344]
"Learning About Phases of the Moon and Eclipses: A Guide for Teachers and Curriculum Developers" [A218]
"Learning About the Earth's Shape and Gravity: A Guide for Teachers and Curriculum Developers" [A219]
"Mission to Saturn" Planetarium Show [A362]
"Mysteries of the Milky Way" Planetarium Show [A363]
NESSIE: Outreach at Professional Conferences [A514]
New England After-School Programs in Space Science [A308]
New England Space Scientists in the Classroom [A515]
New England Workshops in Space Science Education [A95]
New England Workshops on Effective Electronic Communications for Science Education [A96]
Public Presentations by New England Space Scientists [A483]
Redesigning the Milky Way [A486]
Space Science Education at Public Events in New England [A436]
Space Science Education in New England Colleges [A158]
Space Science Workshops for Educators [A109]
Special-Needs Initiative [A32]
Workshops, Sessions, and Seminars for Scientists and E/PO Leads on K–14 Education and Public Outreach [A520]

B41. Southeast Regional Clearinghouse Broker/Facilitator

SERCH B/F

Description: SERCH is a NASA space science E/PO program with the purpose of promoting space science awareness and enhancing interest in science, math, and technology through the use of Earth and space science mission

data, information, and educational products. SERCH works closely with 14 Space Grant consortia (Alabama, Arkansas, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Puerto Rico, South Carolina, Tennesse, and Virginia) throughout the southeastern United States. SERCH serves as a Broker/Facilitator of services between the region's educational community and researchers involved in SMD missions. The goals of SERCH are to (1) develop a network of educators and researchers interested in space science; (2) be an effective interface between researchers and educators in the area of space science; (3) be a primary information and resource clearinghouse for space science data, information, and educational products; (4) support SMD mission scientists in their educational outreach activities; (5) facilitate the modification of SMD materials to meet the needs of diverse educational environments; (6) be a leader in serving exceptional students and the general public; (7) enhance minority involvement across NASA SMD programs; and (8) develop an accessible, nationwide Geographic Information System (GIS) database that provides spatially related information of targeted NASA educational resources.

Lead: Dr. Cassandra Runyon, College of Charleston, Geology, Charleston, SC 29424. E-mail: *cass@cofc.edu*. Phone: 843-953-8279.

URL: *http://serch.cofc.edu/serch/*

Activities: "Exceptional Space Science Materials for Exceptional Students" Workshop [A192]
Followup to Chicago 2004: A Workshop to Foster Broader Participation in NASA Space Science Missions and Research Programs [A508]
New Directions in Astronomy and Astrobiology [A22]
"SEU: Modeling the Universe Workshop": An Exploration of Space and Time [A105]
Space Science for the Blind and Visually Impaired [A316]
Special Needs Resource Group [A248]
Special-Needs Initiative [A32]
Tactile and Technology Focus Group [A257]

B42. Space Science Institute Broker/Facilitator

SSI B/F

Description: The Space Science Institute (SSI) of Boulder, CO, is home to one of seven regional Broker/Facilitator (B/F) programs that support SMD E/PO efforts. The core mission of B/Fs is to cultivate opportunities and partnerships between the education and space science communities that can address important educational needs in their respective regions. The SSI B/F program now serves a large part of the United States, extending from North Dakota to California (Arizona, California, Colorado, Nebraska, North Dakota, New Mexico, Nevada, South Dakota, and Utah). SSI is building on 4 years of "lessons learned" in the B/F role. The goals of our B/F program are to provide strategically valuable support for (1) space scientists' effective E/PO involvement, (2) formal education (emphasizing State-based agendas), (3) informal education (emphasizing planetarium associations, Girl Scouts, and traveling science exhibits), and (4) underserved populations (emphasizing indigenous and Latino educators). This strategic support includes providing professional development opportunities, facilitating access to and use of exemplary materials, and facilitating E/PO participation and/or partnerships. Key collaborators of the SSI B/F program include leaders from two western planetarium associations, the Girl Scouts' Mile-Hi Council, mobile education programs, traveling exhibit programs, the MESA after-school programs, and E/PO leads at major scientific research institutions in our region. To begin to address the vastness of our region, we are developing new electronic resources (e-brokering) for both scientists and educators.

Lead: Dr. Cherilynn Morrow, Space Science Institute, 4750 Walnut Street, Boulder, CO 80301.
E-mail: *camorrow@colorado.edu*. Phone: 720-974-5828.

Contact: Ms. Christy Edwards, Space Science Institute, 4750 Walnut Street, Boulder, CO 80301.
E-mail: *edwardcl@colorado.edu*. Phone: 720-974-5824.

URL: *http://ssibroker.colorado.edu/broker/*

Activities: "Alien Earths" Traveling Exhibit [A335]
Educational Family Guides to the Sun and Mars [A189]
Electronic Newsletter: "Bulletin for Educators in Space Science" ("BESS") [A191]
"Exceptional Space Science Materials for Exceptional Students" Workshop [A192]
Expanding Your Horizons: Outreach to Girls in Science [A468]
Followup to Chicago 2004: A Workshop to Foster Broader Participation in NASA Space Science Missions and Research Programs [A508]
"MarsQuest" Planetarium Show [A359]
"MarsQuest" Traveling Exhibit [A360]
Outreach to Native Americans in the Western Region [A102]
"Regional Opportunities for Scientists in Education" ("ROSIE") [A517]
Space Science Institute: Interactive Exhibits at Community Events [A492]
Space Science Workshops for Educators [A109]
Special-Needs Initiative [A32]
Workshops, Sessions, and Seminars for Scientists and E/PO Leads on K–14 Education and Public Outreach [A520]

B43. Space Science Network Northwest Broker/Facilitator

S2N2 B/F

Description: S2N2 uses a variety of approaches to make formal and informal educators aware of NASA space science programs, materials, and opportunities. S2N2 helps to create sustainable partnerships between formal and

informal educators and NASA SMD missions, forums, and space scientists. S2N2 operates by having a central office at the University of Washington and representatives in the partner States of Washington, Alaska, Hawaii, Oregon, Montana, Idaho, and Wyoming.

Lead: Dr. Julie Lutz, University of Washington, Box 351310, Seattle, WA 98195-1310.
E-mail: *nasaerc@u.washington.edu*. Phone: 206-616-1084.

Contact: Ms. Darlette Powell, University of Washington, Box 351310, Seattle, WA 98195-1310. Phone: 206-543-0214.

URL: *http://www.s2n2.org*

Activities: "Exceptional Space Science Materials for Exceptional Students" Workshop [A192]
Expanding Your Horizons: Outreach to Girls in Science [A468]
Followup to Chicago 2004: A Workshop to Foster Broader Participation in NASA Space Science Missions and Research Programs [A508]
Northwest Workshops in Space Science Education [A98]
S2N2: Adult Education on Space Science [A425]
S2N2: Amateur Astronomy Partnerships [A426]
S2N2: Informal Space Science Opportunities for Youth [A312]
S2N2: Outreach at Professional Education Conferences [A104]
S2N2: Public Events [A427]
Space Science in K–14 Education and Public Outreach [A520]

ASTROPHYSICS MISSIONS

Major Missions

B44. Chandra X-ray Observatory

CXO

Description: The Chandra X-ray Observatory, the third of NASA's "Great Observatories," has completed its fourth year of science operations. Chandra's superb resolution has enabled never-before-seen images of the X-ray emission from such fascinating cosmic sources as the sound waves produced by a black hole, a pair of black holes orbiting in the nucleus of an active galaxy, and the jets and rings of high-energy particles in the remnants of exploded stars. The goals of the Chandra E/PO program are to increase the public's engagement with NASA space science by conveying the excitement of the Chandra discoveries; promoting science literacy by engaging the imaginations of students, educators, and the public; increasing learning opportunities in science, math, and technology with classroom-ready materials that are aligned with national standards; and providing ready access to Chandra images and educational products. The program maintains an extensive public Web site with images, background materials, and educational products that are downloadable in multiple formats. The Web site is now fully compliant with Americans with Disabilities Act section 508 guidelines for visual impairments. Online forms allow educators to order printed and multimedia resources. Opportunities for educators include summer workshops at Tufts University's Wright Center for Science Education, the Rutgers Astrophysics Summer Institute, programs at national and State teachers' conferences, and the Chandra Teacher Resource Agent Program. Printed materials and a CD containing Chandra images are distributed widely to classrooms, planetariums, and amateur astronomy associations. Classroom-ready materials are downloadable from the E/PO Web site. For greater educational impact, an effort is made to present Chandra images in multiwavelength comparisons. A software program tailored for educational use enables students and teachers to work with actual Chandra data and images.

Lead: Ms. Kathleen Lestition, Harvard-Smithsonian Center for Astrophysics, MS 06, 60 Garden Street, Cambridge, MA 02138. E-mail: *klestition@cfa.harvard.edu*. Phone: 617-495-7399.

URL: *http://chandra.harvard.edu*

Activities: Big Explosions and Strong Gravity [A266]
Chandra E/PO Grant: 10 Years of the Penn State Inservice Workshops in Astronomy [A46]
Chandra E/PO Grant: A Multiwavelength Astronomy Guide for the Visually Impaired [A174]
Chandra E/PO Grant: After-School Astronomy Project [A378]
Chandra E/PO Grant: Chandra Astrophysics Institute (CAI) [A131]
Chandra E/PO Grant: Does Dark Matter Really Exist? Observational Benchmarks for the Next Generation [A175]
Chandra E/PO Grant: Stellar Evolution Planetarium Show at the Science Museum of Virginia [A336]
Chandra E/PO Grant: The Sun-Earth Connection [A176]
Chandra X-ray Center: Online Education and Outreach [A459]
Chandra X-ray Center: Operation Control Center Tours [A460]
Chandra X-ray Center: Postdoctoral Fellowship Program [A1]
Chandra X-ray Center: Presentations and Workshops for Students [A269]
Chandra X-ray Center: Public Outreach [A461]
Chandra X-ray Center: Teacher Workshops and Presentations [A47]
"Cosmic Questions: Our Place in Space and Time" Traveling Exhibition [A337]
"Cosmic Questions": Public Outreach Events [A396]
"Inside Einstein's Universe": Education Outreach Program [A356]
MIT Center for Space Research: Tours [A386]
"Science Concepts in Context" [A233]
SEU Forum: Mission Support [A518]

"SEU: Modeling the Universe Workshop": An Exploration of Space and Time [A105]
Sun-Earth DayAncient Observatories-Timeless Knowledge [A440]

B45. Compton Gamma-Ray Observatory

CGRO

Description: CGRO, the second of NASA's "Great Observatories," was launched in April 1991. It had a diverse scientific agenda, including studies of very energetic celestial phenomena such as solar flares, cosmic gamma-ray bursts, pulsars, nova and supernova explosions, accreting black holes of stellar dimensions, quasar emissions, and interactions of cosmic rays with the interstellar medium. Compton left a legacy of outstanding science and revolutionized our knowledge of the gamma-ray sky. Its mission ended in June 2000, when it was deorbited following the failure of one of its three gyroscopes.

Activities: "Science Concepts in Context" [A233]

B46. Constellation-X

Description: Constellation-X has been designed to perform x-ray spectroscopy with unprecedented sensitivity and spectral resolution. The measurement of large numbers of x-ray spectral lines in hot plasmas leads to determining the elemental composition, temperature, and velocity of the emitting matter. Astronomers will determine the flow of gas in accretion disks around black holes in active galactic nuclei and in binary x-ray sources, measure the population of newly created elements in supernova remnants, and detect the influence of dark matter on the hot intergalactic medium in clusters of galaxies. Constellation-X is identified in the SMD strategic plan.

Lead: Ms. Barbara Mattson, NASA Goddard Space Flight Center, Greenbelt Road, Greenbelt, MD 20771-0001. E-mail: *Barbara.J.Mattson.1@gsfc.nasa.gov*. Phone: 301-286–1243.

Activities: "Ask an Astrophysicist" [A451]
Big Explosions and Strong Gravity [A266]
SEU Forum: Mission Support [A518]

B47. Gamma-ray Large Area Space Telescope

GLAST

Description: GLAST is scheduled for launch in late 2006. With GLAST, scientists hope to explore the limits of gravity and energy in the universe and study nature's highest energy acceleration processes. The instruments aboard GLAST have an imaging gamma-ray telescope that is vastly more capable than the instruments flown previously, as well as a secondary instrument to augment the study of gamma-ray bursts. The GLAST E/PO group has developed a program to promote inquiry into the origin and structure of the universe and the fundamental relationship between energy and matter, concepts that are included in the Physical Science Content Standards A, B, and D for grades 9–12. The GLAST Telescope Network (GTN) is being designed to provide information to ground-based visible-light telescopes in conjunction with space-based observations of events producing gamma rays, as well as the development of a ground-based imaging and data archive. The GLAST Educator Ambassador Program consists of 10 educators who will work in conjunction with GLAST science and E/PO team members at SSU and the Stanford Linear Accelerator (SLAC) to develop workshops and curriculum materials. Many printed materials are being developed, including TOPS lesson modules and posters accompanied by educator guides. The GLAST E/PO group also maintains a public-oriented Web site that includes an "Ask a Scientist" feature. Among future programs is an Interactive Gamma-Ray Detector Exhibit under development at Stanford Linear Accelerator's Virtual Visitor Center and additional Space Mysteries, interactive video games that teach physical science and mathematics. Also in development with Thomas Lucas Productions is a "NOVA" or Public Broadcasting Service (PBS) special that takes a sweeping look at high-energy astrophysics.

Lead: Dr. Lynn Cominsky, Sonoma State University, Department of Physics and Astronomy, 1801 East Cotati Avenue, Rohnert Park, CA 94928. E-mail: *lynnc@charmian.sonoma.edu*. Phone: 707-664-2655.

URL: *http://glast.gsfc.nasa.gov*

Activities: "A Swift View of the Universe" Presentation [A388]
"Cosmic Questions: Our Place in Space and Time" Traveling Exhibition [A337]
"Cosmic Questions": Public Outreach Events [A396]
"Exploring the Extreme Universe!" Student Presentations [A272]
GLAST: Mission Sticker [A197]
GLAST: Public Presentations [A403]
GLAST: Tasty Active Galaxy Activity [A198]
GLAST: The High-Energy Classroom Teacher Workshops [A64]
Initiative to Enhance Space Science Education and Research at Norfolk State University [A18]
"Inside Einstein's Universe": Education Outreach Program [A356]
Scale the Universe [A232]
SEU Forum: Mission Support [A518]
"SEU: Modeling the Universe Workshop": An Exploration of Space and Time [A105]
Workshop on Topics in Modern Astronomy [A128]
"You Are Here: Exploring Your Universe from Inner to Outer Space" [A261]

B48. Gravity Probe B Relativity Mission

GP-B

Description: GP-B is producing and distributing educational materials that communicate the science and technology related to the mission, including Einstein's General Theory of Relativity. In addition, GP-B is participating in conferences

and workshops to teach students, teachers, and the general public about GP-B. Materials include posters, an educator's guide, lithograph sets, a DVD video, and brochures. Most materials are available on the GP-B Web site. Additionally, the GP-B Web site is developing a "Spacetime and Relativity" section to introduce and educate users about these concepts.

Lead: Ms. Shannon Range, Stanford University, HEPL 4085, Stanford, CA 94305. E-mail: *range@relgyro.stanford.edu*.

Contact: Ms. Shannon Range, Stanford University, HEPL 4085, Stanford, CA 94305. E-mail: *range@relgyro.stanford.edu*. Phone: 415–867-4689.

URL: *http://einstein.stanford.edu*

Activities:
Conference Presentations of Einstein's Curved Space-Time and Gravity Probe B [A48]
"Cosmic Questions: Our Place in Space and Time" Traveling Exhibition [A337]
"Cosmic Questions": Public Outreach Events [A396]
Einstein and GP-B in the Classroom [A271]
Gravity Probe B: Mission Operations Control Tours [A408]
"Inside Einstein's Universe": Education Outreach Program [A356]
SEU Forum: Mission Support [A518]
"SEU: Modeling the Universe Workshop": An Exploration of Space and Time [A105]
Testing Einstein's Universe Exhibit [A499]

B49. Hubble Space Telescope

HST

Description: The Office of Public Outreach at the STScI was created to share the amazing discoveries of the Hubble Space Telescope with the American public. We are privileged to be the focal point of public attention for a storied NASA European Space Agency (ESA) space science mission to which thousands of engineers, programmers, technicians, administrators, and scientists have devoted their professional gifts. We have developed a multitude of products and programs that have capitalized on the intense interest in Hubble to inform and inspire millions of Americans and many others around the globe.

Lead: Dr. Bruce Margon, Space Telescope Science Institute, 3700 San Martin Drive, Baltimore, MD 21218. E-mail: *margon@stsci.edu*. Phone: 410-338-4459.

URL: *http://hubblesite.org/*

Activities:
"Alien Earths" Traveling Exhibit [A335]
"Cosmic Questions": Public Outreach Events [A396]
Development of GEMS Space Science Core Sequence Curriculum [A186]
Earth and Space Science Education Product Workshop [A54]
Hubble Space Telescope: 15th Anniversary Celebration [A346]
Hubble Space Telescope: "Amazing Space" [A200]
Hubble Space Telescope: Cycle Education and Public Outreach Grant Program [A509]
Hubble Space Telescope: "Heavens Above" Traveling Exhibit [A347]
Hubble Space Telescope: "Hubble: Galaxies Across Space and Time," an IMAX Short Film [A348]
Hubble Space Telescope: HubbleSource Video Collection [A349]
Hubble Space Telescope: Immersive Dome Visualizations for Planetariums [A350]
Hubble Space Telescope: International Planetarium Society Slide Service [A351]
"Hubble Space Telescope: 'New Views of the Universe II'" Traveling Exhibit [A352]
Hubble Space Telescope: Online Broadcast-Quality Hubble Video Clip Library [A353]
Hubble Space Telescope: Postdoctoral Fellowships [A2]
Hubble Space Telescope: Speaker's Bureau [A409]
Hubble Space Telescope: "ViewSpace" [A354]
Hubble Space Telescope: Workshops and Presentations [A472]
In Search of Interacting Galaxies [A213]
Life in Space: An Astronomy/Astrobiology Unit for Upper Elementary and Middle School Students [A220]
"Science Concepts in Context" [A233]
Space Science Workshops for Educators [A109]
Space Telescope Science Institute: Open Night [A437]
Telescopes from the Ground Up [A258]
"What's New on the Outer Planets?" [A505]
Whirlpool Galaxy (M51) and Companion Galaxy Lithograph [A259]

B50. Kepler

Description: The Kepler mission E/PO includes formal education elements like GEMS teacher guides, teacher workshops, "Hands-on Universe" high school activities, and KeplerCam charge-coupled device (CCD) cameras for colleges; informal education elements like planetarium shows, museum exhibits, and public events; and public outreach elements like a public video program, Stardate radio programs, and amateur astronomer's kits.

Lead: Mr. Alan Gould, Lawrence Hall of Science, MC 5200, Berkeley, CA 94720-5200. E-mail: *agould@uclink4.berkeley.edu*. Phone: 510-643-5082.

Contact: Dr. Edna DeVore, Search for Extraterrestrial Intelligence (SETI) Institute, 2035 Landings Drive, Mountain View, CA 94043.

URL: *http://www.kepler.arc.nasa.gov/*

Activities:
"Alien Earths" Traveling Exhibit [A335]
Development of GEMS Space Science Core Sequence Curriculum [A186]

Kepler: Exhibits for Museums and Classroom Demos [A357]
Kepler: Paper Model Spacecraft [A217]
Kepler: Presentations by Scientists and Engineers [A510]
Kepler: Teacher Workshops on Planet Finding [A82]
Space Science Workshops for Educators [A109]
Sun-Earth DayTimeless Knowledge [A440]

B51. Laser Interferometer Space Antenna

LISA

Description: The Space Place has involved LISA in various events/activities. We attend conferences to promote Space Place and all of the projects involved with the Web site. Usually, mission- or Space Place related items are passed out. Libraries, science museums, planetariums, zoos, and aquariums across the United States have formed "Club Space Place" partnerships with NASA. They get Space Place, provided display materials, an activity guide, and handouts for an original group activity. Through these partnerships, we promote the Space Place Web site and NASA missions. Club Space Place provides quarterly interdisciplinary hands-on activities that are space- or Earth science, related. These quarterly activities go to the Space Place library and museum partners, Boys & Girls Clubs of America, the YWCA, and the Civil Air Patrol. Currently, there are 272 partners reaching thousands of children. On a monthly basis, Space Place provides articles for over 20 newspapers nationwide in both English and Spanish. The combined readership of these newspapers adds up to more than 2.5 million. The articles always end with information on activities and links to the Space Place Web site and SMD mission Web sites. Diane Fisher submits articles to "Technology and Children" magazine four times a year and to "The Technology Teacher" magazine eight times a year. Each article published under the Space Place header refers to a particular mission. Each "Technology and Children" publication reaches an estimated 1,400 teachers and their students (possibly 42,000 children), and each "The Technology Teacher" publication reaches an estimated 8,000 teachers and their students (possibly 224,000 children). Each article is also posted on ITEA's Web site, which reaches an even wider audience. The dynamic Space Place Web site offers interactive experiences and fun facts for children and adults. The Space Place is supported by the New Millennium Program. It reaches an average of 3,000 Web users per day.

Lead: Ms. Nancy Leon, NASA Jet Propulsion Laboratory, M/S 171-350, 4800 Oak Grove Drive, Pasadena, CA 91109. E-mail: *Nancy.J.Leon@jpl.nasa.gov*. Phone: 818-354-1067.

URL: *http://spaceplace.nasa.gov*

Activities: Laser Interferometer Space Antenna (LISA) Educator Ambassador Workshop [A84]
SEU Forum: Mission Support [A518]
Space Place: Conferences [A241]
Space Place: Web Site [A243]

B52. Spitzer Space Telescope

SST

Description: The Spitzer Space Telescope E/PO program strives to address NASA's goals of reaching a wide audience and inspiring the next generation of explorers. Our formal education initiative includes a fully accredited online course that teachers may take for continuing education credit or as part of a master's degree in science education. We also offer short courses at all National Science Teachers Association (NSTA) meetings and regional State teacher meetings. In the informal education realm, we are developing a series of ViewSpace presentations, which reach over 100 planetariums and science museums. We are also part of a collaboration on a new traveling museum exhibit on the Origins programs that will debut in 2005. This year saw multiple articles and television segments about our launch and successful startup, and we are addressing the challenge of getting new science and educational materials out to the public as soon as possible.

Lead: Dr. Michelle Thaller, California Institute of Technology (Caltech), 1200 East California Boulevard, Pasadena, CA 91125. E-mail: *thaller@ipac.caltech.edu*. Phone: 626-395–8670.

URL: *http://sirtf.caltech.edu*

Activities: Active Astronomy: Classroom Activities for Learning About Infrared Light [A38]
"Alien Earths" Traveling Exhibit [A335]
Chandra E/PO Grant: A Multiwavelength Astronomy Guide for the Visually Impaired [A174]
Development of GEMS Space Science Core Sequence Curriculum [A186]
Navigator: Center for Astronomy Education [A13]
Space Place: Contributions to Newspapers [A490]
Space Place: Web Site [A243]
Space Science Workshops for Educators [A109]
Spitzer Space Telescope Conference Support [A438]
Spitzer Space Telescope Educator Workshops [A111]
Stellar Mysteries, Stellar Detectives [A249]

B53. Stratospheric Observatory For Infrared Astronomy

SOFIA

Description: SOFIA will consist of a specially modified Boeing 747-SP aircraft carrying a 2.5-meter telescope designed to make sensitive infrared measurements of a wide range of astronomical objects. SOFIA will be a premier observatory for infrared and submillimeter astronomy for the next two decades. SOFIA's E/PO program contributes to the improvement of America's public scientific, mathematical, and technological literacy and greater awareness

of the value of scientific research. SOFIA was designed from the beginning with the capability to allow visiting educators and journalists to observe and participate in the research process. SOFIA's E/PO program will bring the excitement, challenges, discoveries, teamwork, and educational value of the observatory's research to teachers, students, and the general public on a national and international scale. SOFIA E/PO programs include (1) Airborne Astronomy Ambassadors-trained educators who will fly on research missions and compose a national network of master educators who conduct teacher workshops and public presentations; (2) Education Partners Program-SOFIA scientists, instrument builders, engineers, technicians, flight crew, and educators who will partner with teachers in their local communities; (3) Science Literacy and Education Program-symposia at NASA Ames Research Center for undergraduate instructors, science and technology center staff, and planetarium directors; and (4) SOFIA Visiting Educators-a small number of experienced educators who will join the SOFIA E/PO staff for 1-year stints as flight facilitators and outreach personnel. The E/PO program will support a public affairs team that works with the NASA Office of Public Affairs to communicate SOFIA science effectively. SOFIA will be operated for NASA and the German space agency DLR by Universities Space Research Association (USRA). The E/PO program is jointly conducted by the SETI Institute, the Astronomical Society of the Pacific (ASP), and members of the USRA SOFIA team.

Lead: Dr. Dana Backman, NASA Ames Research Center, MS 211-3, Moffett Field, CA 94035.
E-mail: *dbackman@mail.arc.nasa.gov*. Phone: 650-604-2128.

URL: *http://sofia.arc.nasa.gov*

Activities:
Active Astronomy: Classroom Activities for Learning About Infrared Light [A38]
Aeronautical Exposition for Students [A264]
Air Expo for the Public [A448]
"Alien Earths" Traveling Exhibit [A335]
"Astronomy at 41,000 Feet-The Story of SOFIA" [A452]
Electromagnetic Radiation, Astronomy, and SOFIA (for Students with Visual Impairments) [A190]
Electromagnetic Radiation, Infrared Astronomy, and SOFIA (Yerkes Observatory) [A400]
Infrared Radiation, Infrared Astronomy, and SOFIA [A215]
Project ASTRO in Bubb Elementary School, Mountain View [A155]
"Science Concepts in Context" [A233]
SOFIA, SETI, and Kepler: Conference Exhibit Booth [A106]
SOFIA: Conference Exhibit Booth (Scientific Conferences) [A488]
SOFIA: E/PO Conference Posters [A429]
SOFIA: Material Distribution [A236]
SOFIA: Newsletter Distribution [A237]
SOFIA: Public Events [A430]
SOFIA: Tour of the SOFIA Science Mission Operations Center (SSMOC) and SOFIA Hangar [A431]
SOFIA: Tours of the Kuiper Airborne Observatory (KAO) Interior [A432]
Space Science Workshops for Educators [A109]

Explorers

B54. Cosmic Hot Interstellar Plasma Spectrometer

CHIPS

Description: CHIPS uses an extreme ultraviolet spectrograph during its mission to study the "Local Bubble," a tenuous cloud of hot gas surrounding our solar system that extends about 300 light-years from the Sun. The million-degree gas in this region is thought to be generated by supernovae and stellar winds from hot, young stars. But the origins and cooling mechanisms of the gas in the Local Bubble still need to be understood. CHIPS, the first University Class Explorer (UNEX), was launched in January 2003. The CHIPS E/PO program has developed classroom materials and lessons focusing on the fundamental physics concepts behind the mission. These are disseminated through teacher workshops, public events, NASA education networks, and a Web site.

Lead: Dr. Nahide Craig, University of California, Berkeley, MC 7450, Berkeley, CA 94720.
E-mail: *ncraig@ssl.berkeley.edu*. Phone: 510-643-7273.

Contact: Dr. Bryan Mendez, University of California, Berkeley, MC 7450, Berkeley, CA 94720.
E-mail: *bmendez@ssl.berkeley.edu*. Phone: 510-643-2178.

URL: *http://cse.ssl.berkeley.edu/chips_epo/*

Activities:
Cosmic Hot Interstellar Plasma Spectrometer (CHIPS): Classroom Visits and Student Support [A270]
Cosmic Hot Interstellar Plasma Spectrometer (CHIPS): Teacher Professional Development [A49]
"Cosmic Questions: Our Place in Space and Time" Traveling Exhibition [A337]
NASA Balloon Science Workshop [A20]
Reuven Ramaty High Energy Solar Spectroscopic Imager (RHESSI): Teacher Professional Development [A103]
RHESSI: Public Outreach and Informal Education [A424]
SEU Forum: Mission Support [A518]
"SEU: Modeling the Universe Workshop": An Exploration of Space and Time [A105]
STEREO In-situ Measurements of Particles And CME Transients (IMPACT): Curriculum Development and Dissemination [A114]

B55. Galaxy Evolution Explorer

GALEX

Description: The Space Place has involved GALEX in the following events/activities. We attend conferences to promote Space Place and all of the projects involved with the Web site. Usually, mission- or Space Place-provided display materials, an activity guide, and handouts for an original group activity. Through these partnerships, we promote the Space Place Web site and NASA missions. Club Space Place provides quarterly interdisciplinary hands-on activities that are space- or Earth science-related. These quarterly activities go to the Space Place library and museum partners, Boys & Girls Clubs of America, the YWCA, and the Civil Air Patrol. Currently, there are 272 partners reaching thousands of children. On a monthly basis, Space Place provides articles for over 20 newspapers nationwide in both English and Spanish. The combined readership of these newspapers adds up to more than 2.5 million. The articles always end with information on activities and links to the Space Place Web site and SMD mission Web sites. Diane Fisher submits articles to "Technology and Children" magazine four times a year and to "The Technology Teacher" magazine eight times a year. Each article published under the Space Place header refers to a particular mission. Each "Technology and Children" publication reaches an estimated 1,400 teachers and their students (possibly 42,000 children), and each "The Technology Teacher" publication reaches an estimated 8,000 teachers and their students (possibly 224,000 children). Each article is also posted on ITEA's Web site, which reaches an even wider audience. The dynamic Space Place Web site offers interactive experiences and fun facts for children and adults. The Space Place is supported by the New Millennium Program.
Contact: Ms. Liliana Novati, NASA Jet Propulsion Laboratory, M/S 171-350, 4800 Oak Grove Drive, Pasadena, CA 91109. E-mail: *Liliana.Novati@jpl.nasa.gov*. Phone: 818-354-1486.
URL: *http://spaceplace.nasa.gov*
Activities: GALEX: Universe Teacher Workshops [A61]
Space Place: Web Site [A243]

B56. Rossi X-ray Timing Explorer

RXTE

Description: The Rossi X-ray Timing Explorer (RXTE), launched in December 1995, continues to return a stream of impressive results on the physics of matter near sources of extreme gravity (neutron stars, black holes, and the supermassive black hole cores of active galaxies). The mission-a collaboration among NASA's Goddard Space Flight Center, MIT, and the University of California, San Diego-centers on three flight instruments in a low-Earth orbit that investigate the 2-250 kiloelectronvolt (keV) x-ray spectral and milliseconds-to-years timing variability of astronomical sources. Since early in the mission, RXTE has supported an active E/PO program involving the RXTE Learning Center, an online educational resource for teachers and students. RXTE has also hosted teacher interns to design and develop lesson plans and classroom activities based on RXTE results. Recent accomplishments include the All Sky Monitor-based "Tour the X-ray Sky," which uses real data to introduce students to the types of variability seen in x-ray sources, and a series of supporting educator workshops to train teachers on the use of this module in their classroom. During the next 2 years, the RXTE E/PO program will focus on the classroom testing and educator dissemination of a collection of newly developed activities to go with a multimedia RXTE product-"The High Energy Groovie Movie." This movie mates an animation of the x-ray variability of the entire sky over several years of the mission (developed by the All Sky Monitor team at MIT) with a high-energy original pop song, "High Energy Groove" (written and recorded by the Chromatics as part of the AstroCappella project), which describes the basics of modern x-ray astronomy. The activities, which were developed by two Maryland teacher interns in the summer of 2002, cover a range of topics, including the technology behind the PCA detectors, how accretion works in close binary systems, neutron stars and pulsars, active galaxies, and the electromagnetic spectrum.
Lead: Dr. Patricia Boyd, NASA Goddard Space Flight Center, Code 662, Greenbelt Road, Greenbelt, MD 20771-0001. E-mail: *padi@lhea1.gsfc.nasa.gov*. Phone: 301-286-2550.
URL: *http://rxte.gsfc.nasa.gov/docs/xte/learning_center/*
Activities: "Science Concepts in Context" [A233]

B57. Swift Gamma Ray Burst Mission

Swift

Description: The Swift Gamma Ray Burst Explorer is a NASA medium-sized explorer (MIDEX) mission developed by an international collaboration and launched in 2004. Swift is the first of its kind: a multiwavelength observatory dedicated to the study of gamma-ray bursts. The main mission objectives of Swift include determining the origin of gamma-ray bursts, classifying gamma-ray bursts as well as searching for new types, determining how the blast wave evolves and interacts with the surroundings, using gamma-ray bursts to study the early universe, and performing a sensitive survey of the sky in the hard x-ray band. Swift has a complement of three coaligned instruments that study bursts in the gamma-ray, x-ray, ultraviolet, and optical bands. Using prompt burst location information, Swift can slew quickly to point its onboard x-ray and UV/optical instrumentation at the burst for continued afterglow studies. The goal of the Swift mission E/PO at Sonoma State University is to use the observations and scientific discoveries of the Swift mission to improve the understanding and utilization of science and mathematics concepts for grades 7–12. The program, which includes posters accompanied by educator guides, has developed the "Invisible Universe: From Radio Waves to Gamma-rays" in partnership with the GEMS group at the Lawrence Hall of Science. "What's in the News?"—a television show produced by Penn State—informs middle school students across the country about Swift in several different segments that are produced each year. Penn State also offers yearly workshops for science educators that feature Swift and other space-based telescopes. Evaluation and guidance of the development of educational materials comes from the

Swift Education Committee (SwEC) and four Swift Educator Ambassadors, who also help to disseminate Swift's educational materials.

Lead: Dr. Lynn Cominsky, Sonoma State University, Department of Physics and Astronomy, 1801 East Cotati Avenue, Rohnert Park, CA 94928. E-mail: *lynnc@charmian.sonoma.edu*. Phone: 707-664-2655.

URL: *http://swift.gsfc.nasa.gov*

Activities:
"A Swift View of the Universe" Presentation [A388]
"Cosmic Questions: Our Place in Space and Time" Traveling Exhibition [A337]
"Cosmic Questions": Public Outreach Events [A396]
Gamma-Ray Burst Skymap Web Site [A196]
Initiative to Enhance Space Science Education and Research at Norfolk State University [A18]
"Inside Einstein's Universe": Education Outreach Program [A356]
"Invisible Universe'': Teacher Workshops [A81]
SEU Forum: Mission Support [A518]
"SEU: Modeling the Universe Workshop": An Exploration of Space and Time [A105]
Sun-Earth Day-Ancient Observatories-Timeless Knowledge [A440]
Swift Gamma Ray Burst Mission: Public Presentations [A441]
Swift General Student Workshops [A320]
Swift: Glider [A254]
Swift: Launch Lithograph [A255]
Swift: Launch Sticker [A256]
"You Are Here: Exploring Your Universe from Inner to Outer Space" [A261]

B58. Wilkinson Microwave Anisotropy Probe

WMAP

Description: WMAP continues to concentrate its E/PO efforts in electronic forms. WMAP's mission page and "Teacher's Guide to the Universe" Web site explain both the basics about cosmology and mission details. Additionally, WMAP has supported the SEU Forum's creation of the "Cosmic Questions" exhibit and Space Science Update Kiosk. WMAP has created four postcards for public and educational outreach and has helped to create a mission card for the Cosmic Journeys card game. WMAP has been represented at national and State conferences by education staff, and it has contributed to SEU Forum Kits. The WMAP E/PO coordinator has led a course for an informal audience at a local planetarium. WMAP continues to work with the Cooperative Satellite Learning Program and Old Bridge High School.

Lead: Dr. David Spergel, Princeton University, Peyton Hall, Dept. of Astrophysics, Princeton, NJ 08544-1001. E-mail: *dns@astro.princeton.edu*. Phone: 609-258-3589.

Contact: Ms. Lindsay Bartolone, Adler Planetarium and Astronomy Museum, Education, 1300 S. Lake Shore Drive, Chicago, IL 60605. E-mail: *clark@astro.princeton.edu*. Phone: 312-322-0316.

URL: *http://map.gsfc.nasa.gov*

Activities:
"A Teacher's Guide to the Universe": Wilkinson Microwave Anisotropy Probe (WMAP) Workshop [A37]
"Cosmic Questions: Our Place in Space and Time" Traveling Exhibition [A337]
"Cosmic Questions": Public Outreach Events [A396]
Expanding the Universe in the Classroom: Professional Development DVD [A55]
"SEU: Modeling the Universe Workshop": An Exploration of Space and Time [A105]
Wilkinson Microwave Anisotropy Probe (WMAP): Informal Outreach-MAPping the Cosmic Microwave Background [A446]
WMAP: Cooperative Satellite Learning Project (CSLP) [A331]

Navigator

B59. Navigator Program

Description: Navigator E/PO initiatives fall into three key programmatic areas: formal education, informal education, and public outreach (including via Internet and media). Additionally, several crosscutting activities support various components of the plan. All Navigator activities are important to the success of the program; however, two initiatives (the Community College Initiative and the Night Sky Network: Engaging Amateur Astronomy Clubs) stand out as significant new investments for Navigator and may serve as platforms for the participation of other NASA missions in the future.

Lead: Mr. William Greene, NASA Jet Propulsion Laboratory, Mail Code 301–486, 4800 Oak Grove Drive, Pasadena, CA 91109. E-mail: *william.m.greene@jpl.nasa.gov*. Phone: 818-354-1277.

URL: *http://planetquest.jpl.nasa.gov*

Activities:
"Alien Earths" Traveling Exhibit [A335]
Development of GEMS Space Science Core Sequence Curriculum [A186]
Navigator: Center for Astronomy Education [A13]
Navigator: Girls in Science [A481]
Navigator: Night Sky Network [A365]
Navigator: Research Experiences for Minorities [A21]
Navigator: Science Conferences [A513]
Navigator: Museum Exhibits and Alliances [A366]
Navigator: "PlanetQuest" [A482]

Navigator: Student Support and Classroom Visits [A307]
Sun-Earth Day-Ancient Observatories-Timeless Knowledge [A440]

B60. Keck Interferometer

Description: The search for planets in other solar systems (extrasolar planets) and the possibility of extraterrestrial life are topics with the potential for engaging the imagination of a large variety of audiences of disparate ages and cultural and educational backgrounds. The E/PO program of the Keck/IOTA (Infrared Optical Telescope Array) team aims at exploiting this interest to promote the learning of basic physics, planetary science, and astronomy, as well as to reach out into underrepresented groups in science and technology. We have an exceptional opportunity to introduce nonscientists, educators, and students to the interdisciplinary practice of science while they learn about the location of Earth within the solar system and how that position is conducive to the onset of life. They discover that although Earth and the solar system appear to be somewhat unique, other similar systems may yet be found, and participants learn about the ways in which technology has increased our capabilities of searching for planets where life may exist. In addition, Keck participates in the overall Navigator E/PO program.
URL: *http://cfa-www.harvard.edu/cfa/oir/IOTA/*
Activities: One World, Many Worlds: Searching for Life on Earth and Other Planets [A99]
"Science Concepts in Context" [A233]

Attached Payloads

B61. Advanced Cosmic-Ray Composition Experiment for the Space Station

ACCESS
Description: ACCESS is being developed for a possible launch in 2007. This experiment will make spectral, individual-element composition measurements at energies reaching up to 10^15 electronvolts in order to address fundamental questions concerning the origin and acceleration of cosmic radiation.
Activities: Initiative to Enhance Space Science Education and Research at Norfolk State University [A18]

Other NASA Programs

B62. NASA Astrobiology Institute

NAI
Description: NAI is building a future community of astrobiologists while expanding the public's understanding of the nature and importance of our work. NAI's E/PO program is distributed throughout its Lead Teams. Each team directs a local effort with specific emphasis on that team's research and expertise while contributing to larger, collaborative projects. These include Web sites, print products, and curriculum supplements, as well as educational programs and activities, internships, presentations, and exhibits. Educating and training the next generation is another important aspect of NAI's mission, essential to ensuring continuity and longevity of the field of astrobiology. Many of our members train new researchers directly in their academic programs and laboratories. While some of these courses and programs are called "astrobiology," many of them reside within traditional astronomy, biology, chemistry, geology, and planetary science departments. In this way, NAI members are growing the field of astrobiology both as an independent discipline and through the expansion of traditional approaches.
Lead: Ms. Krisstina Wilmoth, NASA Astrobiology Institute (NAI), Ames Research Center, MS 240-1, Moffett Field, CA 94035. E-mail: *Krisstina.L.Wilmoth@nasa.gov*.
Contact: Ms. Daniella Scalice, NASA Astrobiology Institute (NAI), Ames Research Center, MS 240-1, Moffett Field, CA 94035. E-mail: *dscalice@mail.arc.nasa.gov*.
URL: *http://nai.arc.nasa.gov*
Activities: "Alien Earths" Traveling Exhibit [A335]
Development of GEMS Space Science Core Sequence Curriculum [A186]
Expanding Your Horizons: Outreach to Girls in Science [A468]
Exploring Astrobiology: A Penn State-University of Puerto Rico Initiative [A16]
Life in Space: An Astronomy/Astrobiology Unit for Upper Elementary and Middle School Students [A220]
NASA Astrobiology Institute (NAI): NAI Trains the Next Generation of Astrobiologists [A512]
NASA Astrobiology Institute (NAI): NAI Astrobiology Formal Education (K–12) [A306]
NASA Astrobiology Institute (NAI): NAI Astrobiology in the Public Eye [A480]
NASA Astrobiology Institute (NAI): NAI Astrobiology Informal Education [A364]
NASA Astrobiology Institute (NAI): NAI Workshops and Summer Institutes-Teachers Experience Astrobiology [A148]
NASA Astrobiology Institute: Postdoctoral Fellowship Program [A3]
"Science Concepts in Context" [A233]
Space Science Workshops for Educators [A109]

B63. Two Micron All-Sky Survey

2MASS
Description: The 2MASS project was designed to close the gap between our current technical capability and our knowledge of the near-infrared sky. In addition to providing a context for the interpretation of results obtained at infrared and other wavelengths, 2MASS is providing direct answers to immediate questions on the large-scale structure of the Milky Way and the local universe. The optimal use of the next generation of infrared space missions, such as the HST Near Infrared Camera and Multi-Object Spectrometer (NICMOS), the Spitzer Space Telescope, and

the Next Generation Space Telescope (NGST), as well as powerful ground-based facilities, such as Keck I, Keck II, and Gemini, required a new census with vastly improved sensitivity and astrometric accuracy than was previously available. To achieve these goals, 2MASS uniformly scanned the entire sky in three near-infrared bands to detect and characterize point sources brighter than about 1 milliJansky in each band, with a signal-to-noise ratio (SNR) greater than 10, using a pixel size of 2.0 arc seconds. Doing so achieved an 80,000-fold improvement in sensitivity relative to earlier surveys.

URL: *http://www.ipac.caltech.edu/2mass/*

Activities: "Science Concepts in Context" [A233]

B64. Space Technology-7

ST-7

Description: The Space Place has involved ST-7 in various events/activities. We attend conferences to promote Space Place and all of the projects involved with the Web site. Usually, mission- or Space Place-provided display materials, an activity guide, and handouts for an original group activity. Through these partnerships, we promote the Space Place Web site and NASA missions. Club Space Place provides quarterly interdisciplinary hands-on activities that are space- or Earth science-related. These quarterly activities go to the Space Place library and museum partners, Boys & Girls Clubs of America, Young Women's Christian Association (YWCA), and the Civil Air Patrol. Currently, there are 272 partners reaching thousands of children. On a monthly basis, Space Place provides articles for over 20 newspapers nationwide in both English and Spanish. The combined readership of these newspapers adds up to more than 2.5 million. The articles always end with information on activities and a link to the Space Place Web site and SMD mission Web sites. Diane Fisher submits articles to "Technology and Children" magazine four times a year and to "The Technology Teacher" magazine eight times a year. Each article, published under the Space Place header, refers to a particular mission. Each "Technology and Children" publication reaches an estimated 1,400 teachers and their students (possibly 42,000 children), and each "The Technology Teacher" publication reaches an estimated 8,000 teachers and their students (possibly 224,000 children). Each article is also posted on ITEA's Web site, which reaches an even wider audience. The dynamic Space Place Web site offers interactive experiences and fun facts for children and adults. The Space Place is supported by the New Millennium Program.

Lead: Ms. Nancy Leon, NASA Jet Propulsion Laboratory, New Millennium E/PO Program, 4800 Oak Grove Drive, Pasadena, CA 91109. E-mail: *Nancy.J.Leon@jpl.nasa.gov*. Phone: 818-354-1067.

URL: *http://spaceplace.jpl.nasa.gov*

Activities: Space Place: Contributions to Newspapers [A490]
Space Place: Web Site [A243]

B65. High Energy Astrophysics Science Archive Research Center

HEASARC

Description: Since 1996, the HEASARC E/PO program has been bringing information and curriculum support materials to upper middle school, high school, and lower undergraduate students and their teachers on topics relating to the structure and evolution of the universe, with an emphasis on high-energy astronomy. The E/PO program consists of the "Imagine the Universe!" Web site, a series of poster and information/activity booklets, and a repertoire of educator workshops. Both scientists and educators are involved in the development and testing of the materials, which use satellite data to teach topics in science and math. HEASARC also hosts the "StarChild" Web site and annually publishes a CD-ROM containing "Imagine," "StarChild," and the "Astronomy Picture of the Day." Materials are distributed to thousands of educators via workshops, meetings, and e-mail requests. The HEASARC also coordinates with the E/PO programs of other SEU high-energy astrophysics missions such as RXTE, GLAST, Swift, and XMM.

Lead: Dr. James Lochner, NASA Goddard Space Flight Center, Code 662, Greenbelt Road, Greenbelt, MD 20771-0001. E-mail: *lochner@xeric.gsfc.nasa.gov*. Phone: 301-286–9711.

URL: *http://heasarc.gsfc.nasa.gov*

Activities: "Ask an Astrophysicist" [A451]
AstroCappella: A Musical Exploration of the Universe [A42]
Beyond Einstein: From the Big Bang to Black Holes [A44]
Big Explosions and Strong Gravity [A266]
"Black Holes in a Different Light": Educator Workshop [A45]
"Cosmic Questions: Our Place in Space and Time" Traveling Exhibition [A337]
"Cosmic Questions": Public Outreach Events [A396]
Exploring Beyond Einstein: NASA's Search for Answers [A402]
Featured Scientist Article for "Imagine the Universe!" Web Site [A469]
HEASARC: General Educator Workshops [A74]
Hera: NASA Data Analysis in Your Classroom [A75]
"Hidden Lives of Galaxies": Educator Workshop [A76]
High-Energy Astrophysics Exhibit at GSFC Visitor Center [A471]
Imagine the Universe! CD-ROM (9th Edition) [A212]
"Science Concepts in Context" [A233]
SEU Forum: Mission Support [A518]
"SEU: Modeling the Universe Workshop": An Exploration of Space and Time [A105]
"Shedding Light on Einstein" [A428]
Sun-Earth Day-Ancient Observatories-Timeless Knowledge [A440]

West Virginia Eastern Panhandle Regional Science Fair [A329]
"What Is Your Cosmic Connection to the Elements?": Educator Workshop [A126]
"What Is Your Cosmic Connection to the Elements?": Student Presentation [A330]

International Missions with NASA Participation

B66. Cosmic Background Explorer

COBE

Description: The COBE satellite was developed to measure, to the limits set by our astrophysical environment, the diffuse infrared and microwave radiation from the early universe. It was launched in November 1989 and carried three instruments: a Far InfraRed Absolute Spectrophotometer (FIRAS) to compare the spectrum of the cosmic microwave background radiation with a precise black body, a Differential Microwave Radiometer (DMR) to map the cosmic radiation precisely, and a Diffuse InfraRed Background Experiment (DIRBE) to search for the cosmic infrared background radiation. The cosmic microwave background spectrum was measured with a precision of 0.005 percent; the results confirmed the Big Bang theory of the origin of the universe.

URL: *http://nssdc.gsfc.nasa.gov/database/MasterCatalog?sc=1989-089A*

Activities: "Science Concepts in Context" [A233]

B67. High Energy Transient Explorer 2

HETE-2

Description: HETE-2's prime objective is to carry out a multiwavelength study of gamma-ray bursts (GRBs) with ultraviolet, x-ray, and gamma-ray instruments. A unique feature of the mission is its capability to localize bursts with several-arc-second accuracy in near real time aboard the spacecraft. The original HETE spacecraft was lost as a result of a launch failure in November 1996. (HETE-2 was launched in October 2000.)

Lead: Dr. Irene Porro, Massachusetts Institute of Technology, NE80-6095, 77 Massachusetts Avenue, Cambridge, MA 02139. E-mail: *iporro@space.mit.edu*. Phone: 617-258-7481.

URL: *http://space.mit.edu/HETE/*

Activities: "Cosmic Questions: Our Place in Space and Time" Traveling Exhibition [A337]
SEU Forum: Mission Support [A518]
"SEU: Modeling the Universe Workshop": An Exploration of Space and Time [A105]

B68. Suzaku

Description: Suzaku is a joint U.S.-Japanese mission to explore the x-ray universe at high spectral resolution. The mission uses a microcalorimeter that determines x-ray energies from cosmic sources by measuring the heat deposited by the x rays into an absorbing material. To accomplish this, the detector is cooled to 60 millikelvins using an adiabatic demagnetization refrigerator. The mission also includes lightweight mirrors to focus the x rays onto the detectors. Suzaku will probe the chemical composition of supernova remnants and galaxy clusters and will measure the motion of material before it falls into a black hole. The E/PO program for the mission seeks to bring students into the science and technology of the mission. Working with the NASA Student Involvement Program, Suzaku will sponsor a competition for students to share in the data from the mission. The Suzaku Guest Observer Facility at NASA's Goddard Space Flight Center will support this effort. We will also produce a video that tells the story of the science, technology, and history of the mission for teachers to use in their science, math, or social studies classes. The video will particularly touch on the cross-cultural aspects of working with the Japanese. These efforts will be supported by a Web site that will provide background material and lessons on the use of spectroscopy in x-ray astronomy.

Lead: Dr. James Lochner, NASA Goddard Space Flight Center, Code 662, Greenbelt Road, Greenbelt, MD 20771-0001. E-mail: *lochner@xeric.gsfc.nasa.gov*. Phone: 301-286–9711.

URL: *http://suzaku-epo.gsfc.nasa.gov/docs/suzaku-epo//*

Activities: "Ask an Astrophysicist" [A451]
"Cosmic Questions: Our Place in Space and Time" Traveling Exhibition [A337]
"Exploring the Hot Universe with the Coolest Satellite" Educator Workshop [A58]
"Exploring the Hot Universe with the Coolest Satellite": Student Workshop [A273]
High-Energy Astrophysics Exhibit at GSFC Visitor Center [A471]
"SEU: Modeling the Universe Workshop": An Exploration of Space and Time [A105]
Workshop on Topics in Modern Astronomy [A128]

B69. X-ray Multi-Mirror Mission

XMM

Description: XMM-Newton is a European Space Agency x-ray spectroscopy observatory launched in December 1999. Beginning in 2003, NASA participation in the XMM-Newton E/PO program has been led by the group at Sonoma State University. The program is developing curriculum materials for grades 6–12, a computer-based x-ray spectroscopy simulation laboratory exercise in partnership with Project CLEA (Contemporary Laboratory Experiences in Astronomy), and a Starlab planetarium program showcasing the x-ray sky.

Lead: Dr. Lynn Cominsky, Sonoma State University, Department of Physics and Astronomy, 1801 East Cotati Avenue, Rohnert Park, CA 94928. E-mail: *lynnc@charmian.sonoma.edu*. Phone: 707-664-2655.

URL: *http://xmm.sonoma.edu*

Activities: "Inside Einstein's Universe": Education Outreach Program [A356]
XMM-Newton: High-Energy Public Presentations [A447]

XMM-Newton: High-Energy Student Presentations [A333]
XMM-Newton: High-Energy Teacher Workshops [A129]
"You Are Here: Exploring Your Universe from Inner to Outer Space" [A261]

HELIOPHYSICS MISSIONS

Major Missions

B70. Solar Probe

SP

Description: Solar Probe (SP) will make the first visit to our star to explore the complex and time-varying interplay of the Sun and Earth, which affects human activity. SP will determine where and what physical processes heat the corona and accelerate the solar wind to its supersonic velocity. A combined remote sensing and in situ sampling from within the solar corona itself will provide a "ground" never before available from astronomical measurements made from spacecraft in the Earth's orbit or Lagrange points. Solar Probe is currently being developed as part of the Sun-Earth Connection theme within the NASA Science Mission Directorate.
URL: *http://solarprobe.gsfc.nasa.gov/*
Activities: "Passport To The Solar System" (PTSS) [A228]

B71. Ulysses

Description: Ulysses makes passes over the north and south poles of the Sun in order to forecast solar weather. Launched in October 1990, the spacecraft was the first to explore interplanetary science at high solar latitudes.
URL: *http://www.ulysses.jpl.nasa.gov/index.html*
Activities: NASA Balloon Science Workshop [A20]
"Passport To The Solar System" (PTSS) [A228]
"Science Concepts in Context" [A233]
Ulysses: Jet Propulsion Laboratory Open House [A444]
Ulysses: Speakers Bureau [A327]
Ulysses: Teacher Training [A125]
Ulysses: Web Site [A502]
Voyager: Public Outreach [A445]

B72. Voyager

Description: The Voyager mission continues its quest to expand the boundaries of space exploration. Voyager 1, now the most distant humanmade object in the universe, and Voyager 2, close on its heels, continue their groundbreaking journeys with their current mission to study the region in space where the Sun's influence ends and the dark recesses of interstellar space begin.
Lead: Ms. Andrea Angrum, NASA Jet Propulsion Laboratory, 4800 Oak Grove Drive, Pasadena, CA 91109. E-mail: *andrea.angrum@jpl.nasa.gov*. Phone: 818-354-6775.
URL: *http://voyager.jpl.nasa.gov*
Activities: "Passport To The Solar System" (PTSS) [A228]
"Science Concepts in Context" [A233]
Space Place: Contributions to Newspapers [A490]
Sun-Earth Day-Ancient Observatories-Timeless Knowledge [A440]
Ulysses: Jet Propulsion Laboratory Open House [A444]
Ulysses: Teacher Training [A125]
Voyager: Classroom Visits [A328]
Voyager: Public Outreach [A445]
Voyager: Web Site [A503]

Explorers

B73. Advanced Composition Explorer

ACE

Description: The primary purpose of the ACE is to determine and compare the isotopic and elemental composition of several distinct samples of matter, including the solar corona, the interplanetary medium, the local interstellar medium, and galactic matter. For education and public outreach, ACE shares the following topics through a Web site, printed materials, workshops, and presentations: the composition of the solar system and extrasolar bodies, particle composition from solar wind to galactic cosmic rays, the causes and effects of transient events, solar and galactic evolution, and stellar nucleosynthesis.
Lead: Ms. Beth Barbier, NASA Goddard Space Flight Center, Greenbelt Road, Greenbelt, MD 20771-0001. E-mail: *beth@milkyway.gsfc.nasa.gov*. Phone: 301-286-7209.
URL: *http://www.srl.caltech.edu/ACE/ASC/*
Activities: ACE Classroom Presentations [A263]
ACE Public Lectures [A389]
Answering Web Questions for Solar Week [A390]
"Ask a Physicist" [A450]

"Ask an Astrophysicist" [A451]
Earth and Space Science Education Product Workshop [A54]
Hera: NASA Data Analysis in Your Classroom [A75]
High-Energy Astrophysics Exhibit at GSFC Visitor Center [A471]
Los Alamos Space Science Outreach (LASSO) Program [A142]
"Passport To The Solar System" (PTSS) [A228]
"Science Concepts in Context" [A233]
Student Observation Network: Tracking a Solar Storm [A253]
Sun-Earth Day-Ancient Observatories-Timeless Knowledge [A440]
"What Is Your Cosmic Connection to the Elements?": Student Presentation [A330]
Workshop on Topics in Modern Astronomy [A128]
Young Engineers and Scientists (YES) Program [A334]

B74. Fast Auroral SnapshoT (FAST) Explorer

Description: The FAST Explorer was launched into orbit in August 1996. The instruments aboard FAST measure charged particles that enter Earth's upper atmosphere. Large waves of these particles from the Sun begin to glow once inside Earth's atmosphere, causing a spectacular light show known as the aurora borealis, or northern lights. The education and public outreach for FAST includes K–12 curriculum components such as lessons, activities, and information that will help teachers and students understand the aurora, the sounding rockets, and the satellites that study them.

Lead: Dr. Nahide Craig, University of California, Berkeley, MC 7450, Berkeley, CA 94720.
E-mail: *ncraig@ssl.berkeley.edu*. Phone: 510-643-7273.

URL: *http://cse.ssl.berkeley.edu/fast_epo/*

Activities:
Earth and Space Science Education Product Workshop [A54]
Exploring Magnetism in Solar Flares [A193]
Fast Auroral SnapshoT (FAST): Curriculum Development, Dissemination, and Public Outreach [A195]
FAST: Classroom Visits and Student Support [A274]
Reuven Ramaty High Energy Solar Spectroscopic Imager (RHESSI): Teacher Professional Development [A103]
RHESSI: Classroom Visits and Student Support [A311]
RHESSI: Public Outreach and Informal Education [A424]
STEREO In-situ Measurements of Particles And CME Transients (IMPACT): Curriculum Development and Dissemination [A114]
STEREO: Teacher Professional Development [A115]
Sun-Earth Day-Ancient Observatories-Timeless Knowledge [A440]
THEMIS: Education and Public Outreach [A121]
THEMIS: Teacher Professional Development [A122]

B75. Imager for Magnetopause-to-Aurora Global Exploration

IMAGE

Description: The IMAGE satellite is the first spacecraft dedicated to imaging Earth's magnetosphere, a region of space that is controlled by Earth's magnetic field and contains extremely tenuous plasmas of both solar and terrestrial origin. IMAGE employs a variety of imaging techniques to see the invisible and produce the first comprehensive global images of plasma in the inner magnetosphere. The IMAGE education and public outreach program is called Public Outreach, Education, Teaching and Reaching Youth (POETRY). We specialize in developing classroom activities, CD-ROMs, and other products that help students understand Earth's magnetic field, its radiation belts, and the impact of solar activity on our technology. The goal of POETRY is to rewrite textbooks to explain the causes of auroras, to update K–12 descriptions of Earth's magnetic field and its systems of particles, and to provide teachers with the latest information about the effects of space weather. We also conduct an award-winning "Ask the Space Scientist" Web-based forum, where students may ask questions about space science.

Contact: Dr. Deborah Jensen, Rice University, Biochemistry and Cell Biology, MS 140, 6100 Main Street, Houston, TX 77251-1892. E-mail: *djensen@rice.edu*. Phone: 713-349-1800.

URL: *http://image.gsfc.nasa.gov/poetry*

Activities:
Earth and Space Science Education Product Workshop [A54]
Earth Science Planetarium Shows [A341]
IMAGE: "Ancient Observatories: Timeless Knowledge" [A77]
IMAGE: An Introduction to Geomagnetism [A201]
IMAGE: "Ask the Space Scientist" [A473]
IMAGE: Classroom Visits [A291]
IMAGE: Exploring Earth's Magnetic Field [A202]
IMAGE: Museum and Library Lectures [A474]
IMAGE: Northern Lights and Solar Sprites [A203]
IMAGE: Planetarium Programs and Museum Kiosks [A355]
IMAGE: Public Talks [A410]
IMAGE: Radiation Belts and Trapped Particles [A204]
IMAGE: Radio Programs [A411]
IMAGE: Soda Bottle Magnetometer [A205]
IMAGE: Solar Storms and You! [A206]
IMAGE: Space Science Mathematics [A207]

IMAGE: Space Weather CD-ROM [A208]
IMAGE: Teacher Workshops and Conferences [A78]
IMAGE: The Northern Lights [A209]
IMAGE: "The SciFiles: The Case of the Technical Knockout" [A210]
IMAGE: Transit of Venus [A211]
IMAGE: Webcast [A412]
Magnetospheric MultiScale (MMS): Workshop and Conference Presentations [A414]
"Passport To The Solar System" (PTSS) [A228]
"Science Concepts in Context" [A233]
Student Observation Network: Tracking a Solar Storm [A253]
Sun-Earth Day-Ancient Observatories-Timeless Knowledge [A440]
Teacher Courses in Master of Science Teaching Program [A162]

B76. Reuven Ramaty High Energy Solar Spectroscopic Imager
RHESSI

Description: RHESSI is funded by NASA's Explorers Program under the category of small explorers. RHESSI may help to answer one of the most fundamental questions about how the Sun works: How do solar flares release such large quantities of energy in such a short span of time? (A single flare can be as powerful as 10 million volcanic explosions!) The centerpiece of the RHESSI mission is the imager, which uses a new technology to capture images and spectra of high-energy solar flares. RHESSI's primary E/PO goal is to provide high-quality education and outreach experiences for precollege teachers, students, and the general public. Additionally, through our university/NASA Center collaboration, RHESSI will be able to provide research opportunities to enhance the education of undergraduate and graduate students. Thus, the RHESSI E/PO effort will permeate all facets of the mission, allowing the college-level students to serve as effective liaisons to the precollege community that we plan to involve. The University of California, Berkeley's E/PO efforts will focus on middle and high school teachers, their students, and the public. In the formal arena, they will concentrate on the middle school grades 6–8, since that is where RHESSI-related content is taught in the precollege science curriculum and where many students stop being interested in science. They will also conduct regular public-awareness activities, highlighting RHESSI data in collaboration with the Exploratorium. The Exploratorium's "Live@the Exploratorium" Internet Webcast series will be able to highlight RHESSI during the years of high solar activity through regularly scheduled public events. To complement these high-visibility Internet Webcasts for the public, we will develop self-guided Internet modules that highlight key aspects of the RHESSI mission and its data.

Lead: Dr. Nahide Craig, University of California, Berkeley, MC 7450, Berkeley, CA 94720.
E-mail: *ncraig@ssl.berkeley.edu*. Phone: 510-643-7273.

URL: *http://cse.ssl.berkeley.edu/hessi*

Activities: Answering Web Questions for Solar Week [A390]
Earth and Space Science Education Product Workshop [A54]
Reuven Ramaty High Energy Solar Spectroscopic Imager (RHESSI): Teacher Professional Development [A103]
RHESSI: Classroom Visits and Student Support [A311]
RHESSI: Public Outreach and Informal Education [A424]
STEREO In-situ Measurements of Particles And CME Transients (IMPACT): Curriculum Development and Dissemination [A114]
STEREO: Teacher Professional Development [A115]
Student Observation Network: Tracking a Solar Storm [A253]
Sun-Earth Connection Education Forum (SECEF): Educator Conference Support [A116]
Sun-Earth Day-Ancient Observatories-Timeless Knowledge [A440]
THEMIS: Education and Public Outreach [A121]
THEMIS: Teacher Professional Development [A122]

B77. Solar Anomalous and Magnetospheric Particle EXplorer
SAMPEX

Description: SAMPEX is designed to detect solar energy particles, precipitating energetic electrons, anomalous cosmic rays, and galactic cosmic rays throughout a solar cycle. E/PO consists of SAMPEX scientists and engineers at NASA's Goddard Space Flight Center who support a high school team in the Cooperative Satellite Learning Project (CSLP). The CSLP is a unique education partnership among various high schools; Allied Signal Technical Services Corporation in Seabrook, MD; and Goddard that involves high school students in the process of developing and operating SAMPEX. This pilot program provides students with an understanding of the overall end-to-end system that is used to support SAMPEX, and it will demonstrate how NASA implements a specific mission for a given scientific endeavor. It also introduces the students to careers in space. A mission-monitoring system in the high school receives and processes SAMPEX satellite data and provides computer-assisted tutoring. In this way, students participate directly in SAMPEX tests, simulations, and orbital operations.

Lead: Mr. Jim Watzin, NASA Goddard Space Flight Center, Code 474, Greenbelt Road, Greenbelt, MD 20771-0001.
E-mail: *jim.watzin@gsfc.nasa.gov*. Phone: 301-286-7933.

URL: *http://sunland.gsfc.nasa.gov/smex/sampex/index.html*

Activities: "Passport To The Solar System" (PTSS) [A228]

B78. Student Nitric Oxide Explorer
SNOE

Description: SNOE is a small scientific satellite that is measuring the effects of energy from the Sun and the magnetosphere on the density of nitric oxide in Earth's upper atmosphere. It is one of the three projects selected for the STudent Explorer Demonstration Initiative (STEDI) Program to demonstrate that university-led teams can successfully carry out high-quality space science and technology missions. Students are involved in all aspects of the project. Under the supervision of the Laboratory for Atmospheric and Space Physics (LASP) at the University of Colorado (UC) and industry mentors, they worked on the design study, built the spacecraft and instruments, wrote the flight software, integrated and tested the instruments and subsystems, and integrated the satellite with the launch vehicle. SNOE will be operated from the LASP Space Technology Research building by a team of students and mission operations professionals. Advanced undergraduate and graduate students will analyze the data. The student training effort was coordinated through a course offered continuously in the UC Department of Aerospace Engineering Sciences.
Lead: Mr. Kenneth Mankoff, University of Colorado, Boulder, Boulder, CO 80309. E-mail: *mankoff@lasp.colorado.edu*. Phone: 303–492-2326.
URL: *http://lasp.colorado.edu/snoe/*
Activities: Student Nitric Oxide Explorer Guest Investigator: Modeling and Observations of Solar Influences on Thermospheric Nitric Oxide [A252]

B79. Time History of Events and Macroscale Interactions during Substorms

THEMIS

Description: The Time History of Events and Macroscale Interactions during Substorms (THEMIS) is to be launched in 2007. THEMIS is a five-satellite mission with the job of determining the causes of the global reconfigurations of Earth's magnetosphere that are evidenced in auroral activity. THEMIS consists of five small satellites, carrying identical suites of electric, magnetic, and particle detectors, that will be put in carefully coordinated orbits. Every 4 days, the satellites will line up along Earth's magnetic tail, allowing them to track disturbances. The satellite data will be combined with observations of the aurora from a network of observatories across the Arctic Circle. As part of the E/PO program for the THEMIS mission, new ground magnetometer stations will be established at secondary schools and tribal and community colleges in eight States. The Space Grant Consortia of the eight States (Alaska, Oregon, Montana, North Dakota, South Dakota, Wisconsin, Michigan, Pennsylvania) worked with the mission and the State schools to identify the locations for the magnetometer stations and coordinate local educational and outreach efforts of the new facility, its data, and the THEMIS mission, extending the impact of each magnetometer station beyond the single school at which it is located.
URL: *http://sprg.ssl.berkeley.edu/themis/*
Activities: Earth and Space Science Education Product Workshop [A54]
Reuven Ramaty High Energy Solar Spectroscopic Imager (RHESSI): Teacher Professional Development [A103]
RHESSI: Classroom Visits and Student Support [A311]
RHESSI: Public Outreach and Informal Education [A424]
STEREO: Teacher Professional Development [A115]
Student Observation Network: Tracking a Solar Storm [A253]
Sun-Earth Day-Ancient Observatories-Timeless Knowledge [A440]
THEMIS: Education and Public Outreach [A121]
THEMIS: Teacher Professional Development [A122]

B80. Transition Region And Coronal Explorer

TRACE

Description: A mission of the Small Explorer program, TRACE observes the effects of the emergence of magnetic flux from deep inside the Sun to the outer corona with high spatial and temporal resolution. (TRACE was launched in April 1998.)
Lead: Ms. Dawn Myers, NASA Goddard Space Flight Center, 682, Greenbelt Road, Greenbelt, MD 20771-0001. E-mail: *dcm@chippewa.nascom.nasa.gov*. Phone: 301-286-5283.
URL: *http://nis-www.lanl.gov/nis-projects/twins/*
Activities: Answering Web Questions for Solar Week [A390]
Earth and Space Science Education Product Workshop [A54]
"Passport To The Solar System" (PTSS) [A228]
"Science Concepts in Context" [A233]
Student Observation Network: Tracking a Solar Storm [A253]
Sun-Earth DayAncient Observatories-Timeless Knowledge [A440]
TRACE: Image Distribution to the Public [A443]
TRACE: Support for Educational and Public Outreach [A323]
TRACE: Support for "Expanding Your Horizons" Workshop [A324]
TRACE: Support of Interns at SAO [A325]
TRACE: Support of Student Interns [A326]

International Solar-Terrestrial Physics (ISTP)

B81. Cluster II

Description: Cluster is a European Space Agency program with major NASA involvement. The four Cluster spacecraft carry out 3-D measurements in Earth's magnetosphere, covering both large- and small-scale phenomena in the

sunward and tail regions. The first two spacecraft were launched in July 2000; the second pair were launched in August 2000.

Lead: Dr. Patricia Reiff, Rice University, Physics and Astronomy, 6100 Main Street, Houston, TX 77251-1892. E-mail: *reiff@rice.edu*. Phone: 713-348-4634.

Contact: Dr. Deborah Jensen, Rice University, MS 140, 6100 Main Street, Houston, TX 77251-1892. E-mail: *djensen@rice.edu*. Phone: 713-349-1800.

URL: *http://sci.esa.int/home/clusterii/index.cfm*

Activities: Cluster II: Public Talks [A394]
Earth Science Planetarium Shows [A341]
Magnetospheric MultiScale (MMS): Underserved Minority Student Presentations [A297]
Teacher Courses in Master of Science Teaching Program [A162]

B82. Polar

Description: The Solar Terrestrial Science Program (STSP), composed of SOHO and Cluster, with Geotail (Institute of Space and Astronautical Science ([ISAS]-Japan), Wind, and Polar, cooperates in E/PO by providing educational products, science data, and images that tell the story of the Sun. These materials (images) can been seen in most museums, planetariums, and science centers, and they support STSP's work with the general public. Images are also shown by national television broadcasting companies to share a solar event with the public when it happens.

Lead: Dr. Nicola Fox, Johns Hopkins University Applied Physics Laboratory, 11100 Johns Hopkins Road, Laurel, MD 20723-6099. E-mail: *foxnj1@jhuapl.edu*.

URL: *http://www-spof.gsfc.nasa.gov/istp/polar/*

Activities: Do Killer Electrons Affect You? [A187]
Earth and Space Science Education Product Workshop [A54]
"Passport To The Solar System" (PTSS) [A228]
"Science Concepts in Context" [A233]
Student Observation Network: Tracking a Solar Storm [A253]
Sun-Earth Day-Ancient Observatories-Timeless Knowledge [A440]

B83. Wind

Description: The Solar Terrestrial Science Program (STSP), composed of SOHO and Cluster, with Geotail (ISAS-Japan), Wind, and Polar, cooperates in education and public outreach by providing educational products, science data, and images that tell the story of the Sun. These materials (images) can been seen in most museums, planetariums, and science centers, and they support STSP's work with the general public. Images are also shown by national television broadcasting companies to share a solar event with the public when it happens.

Lead: Dr. Nicola Fox, Johns Hopkins University Applied Physics Laboratory, 11100 Johns Hopkins Road, Laurel, MD 20723-6099. E-mail: *foxnj1@jhuapl.edu*.

URL: *http://www-istp.gsfc.nasa.gov/istp/wind/wind.html*

Activities: Earth and Space Science Education Product Workshop [A54]
Graduate Space Science Education and Disturbed Solar Wind Effects on Earth's Environment [A17]
"Passport To The Solar System" (PTSS) [A228]
"Science Concepts in Context" [A233]
Student Observation Network: Tracking a Solar Storm [A253]
Sun-Earth Day-Ancient Observatories-Timeless Knowledge [A440]

B84. Solar and Heliospheric Observatory

SOHO

Description: SOHO is designed to study the internal structure of the Sun, its extensive outer atmosphere, and the origin of the solar wind: the stream of highly ionized gas that blows continuously outward through the solar system. SOHO is helping us to better understand the interactions between the Sun and Earth's environment. Its legacy may enable scientists to solve some of the most perplexing riddles about the Sun, including the heating of the solar corona, the acceleration of the solar wind, and the physical conditions of the solar interior. It will give solar physicists their first long-term, uninterrupted view of the mysterious star that we call the Sun. The SOHO E/PO program generates and distributes materials on the Sun and SOHO for use in schools and by the public. The materials include posters, CDs, image sets, slide sets, stickers, and videos. Scientists give presentations in classrooms, at teacher workshops, in museums, and to other scientists. Materials are also provided to publications and news organizations.

Lead: Mr. Steele Hill, NASA Goddard Space Flight Center, Code 682.3, Greenbelt Road, Greenbelt, MD 20771-0001. E-mail: *steele.hill@gsfc.nasa.gov*. Phone: 301-286-6452.

Contact: Mr. Dennis Christopher, NASA Goddard Space Flight Center, Code 600, Greenbelt Road, Greenbelt, MD 20771-0001. E-mail: *dennis@grace.nascom.nasa.gov*.

URL: *http://soho.nascom.nasa.gov/*

Activities: Answering Web Questions for Solar Week [A390]
Earth and Space Science Education Product Workshop [A54]
"Passport To The Solar System" (PTSS) [A228]
"Science Concepts in Context" [A233]
SOHO: Support for Educational Outreach [A315]
Space Science Workshops for Educators [A109]

Student Observation Network: Tracking a Solar Storm [A253]
Sun-Earth Day-Ancient Observatories-Timeless Knowledge [A440]

Solar Terrestrial Probes (STP)

B85. Solar Terrestrial Probes/Program Office

STP/PO

Description: The STP program is a comprehensive effort to observe and understand our star and its effect on our environment. The E/PO effort focuses on sharing those discoveries in the formal and informal education communities through mentoring, exhibits, and workshops.

URL: *http://stp.gsfc.nasa.gov*

Activities:
Solar Terrestrial Probes: Classroom and Public Engagements [A433]
Solar Terrestrial Probes: Educational Programs and Workshops [A434]
Solar Terrestrial Probes: Planetarium, Science Center, and Museum Outreach [A435]

B86. Magnetospheric MultiScale

MMS

Description: Broad regions of Earth's magnetosphere are connected by fundamental processes operating in the thin boundary layers. Processes of vastly different scale sizes can interact strongly. Understanding these fundamental processes requires multipoint measurements that uniquely separate temporal and 3-D spatial variations. The MMS mission goal is to make those necessary measurements with a five-spacecraft constellation in highly elliptical orbits. MMS is a future Solar Terrestrial Probes mission.

Lead: Dr. Patricia Reiff, Rice University, Physics and Astronomy, 6100 Main Street, Houston, TX 77251-1892. E-mail: *reiff@rice.edu*. Phone: 713-348-4634.

Contact: Dr. Deborah Jensen, Rice University, Biochemistry and Cell Biology, MS 140, 6100 Main Street, Houston, TX 77251-1892. E-mail: *djensen@rice.edu.* Phone: 713-349-1800.

URL: *http://stp.gsfc.nasa.gov/missions/mms/mms.htm*

Activities:
Earth Science Planetarium Shows [A341]
Immersive Earth: Conference Demonstrations [A79]
Magnetospheric MultiScale (MMS): School Visits [A295]
Magnetospheric MultiScale (MMS): Student Programs [A296]
Magnetospheric MultiScale (MMS): Underserved Minority Student Presentations [A297]
Magnetospheric MultiScale (MMS): Workshop and Conference Presentations [A414]
Teacher Courses in Master of Science Teaching Program [A162]
Young Engineers and Scientists (YES) Program [A334]

B87. Solar-B

Description: The Solar-B satellite observatory will be launched into a polar orbit around Earth to allow almost uninterrupted observations of our Sun. Three major instruments will make coordinated observations at multiple wavelengths, examining processes taking place on the Sun's surface and in its atmospheric envelope. Solar-B E/PO is primarily developed and implemented at the new Chabot Space and Science Center in Oakland, CA, in collaboration with the Lockheed Martin Solar and Astrophysics Lab. Forms of E/PO include exhibits, teacher training workshops, video/multimedia productions, posters, brochures, an adult solar astronomy class, "solar" summer camps for children, and a high school solar astronomy internship program.

Lead: Mr. Benjamin Burress, Chabot Space and Science Center, 10000 Skyline Blvd, Oakland, CA 94619. E-mail: *bburress@chabotspace.org*. Phone: 510-336-7308.

URL: *http://www.chabotspace.org/vsc/exhibits/solarb/default.asp*

Activities:
Ancient Eyes Looked to the Skies: Archaeoastronomy in the Americas [A40]
Chabot Science Center: Winter Solstice 2004 [A393]
"Fun in the Sun" Summer Camp [A343]
Sun Explorer Activity Backpack [A496]
Sun-Earth Day-Ancient Observatories-Timeless Knowledge [A440]
"Touch the Sun": Teacher Workshop [A124]

B88. Solar TErrestrial RElations Observatory

STEREO

Description: STEREO is the third of five Solar Terrestrial Probes. This mission will obtain simultaneous images of the Sun from two spacecraft and build a 3-D picture of coronal mass ejections (CMEs) and the complex structures around them. STEREO will also study the propagation of disturbances through the heliosphere and their effects at Earth orbit. The STEREO E/PO program participates in the Sun-Earth Connection Education Forum-sponsored workshops that meet the needs of educators at all grade levels. We present these workshops to inservice educators to teach them about the most recent and relevant solar and STEREO science discoveries, which they will then teach in their classrooms. Mission scientists participate in the workshops to share the science content. Education specialists provide integrated, hands-on activities to demonstrate science applications in the classroom. The missions also provide images and animations to support programs that have been developed by the science centers specifically for educators and for the general public.

Lead: Dr. Nahide Craig, University of California, Berkeley, MC 7450, Berkeley, CA 94720. E-mail: *ncraig@ssl.berkeley.edu*. Phone: 510-643-7273.

URL: *http://stp.gsfc.nasa.gov/missions/stereo/stereo.htm*
Activities: Earth and Space Science Education Product Workshop [A54]
MESSENGER: Student Support [A304]
"Passport To The Solar System" (PTSS) [A228]
Reuven Ramaty High Energy Solar Spectroscopic Imager (RHESSI): Teacher Professional Development [A103]
RHESSI: Classroom Visits and Student Support [A311]
RHESSI: Public Outreach and Informal Education [A424]
Solar TErrestrial RElations Observatory (STEREO): Mission Information [A239]
STEREO In-situ Measurements of Particles And CME Transients (IMPACT): Curriculum Development and Dissemination [A114]
STEREO/IMPACT: Classroom Visits and Student Support [A317]
STEREO/IMPACT: Public Outreach [A495]
STEREO: Fact Sheet [A250]
STEREO: Teacher Professional Development [A115]
STEREO: Web Site [A251]
THEMIS: Education and Public Outreach [A121]
THEMIS: Teacher Professional Development [A122]
TIMED: Teacher Support [A123]

B89. Thermosphere Ionosphere Mesosphere Energetics and Dynamics

TIMED
Description: The TIMED mission is currently studying the influences of the Sun and human activity on the least explored and understood region of Earth's atmosphere: the Mesosphere and Lower Thermosphere/Ionosphere (MLTI). The MLTI region is the gateway between Earth's environment and space, where the Sun's energy is first deposited into Earth's environment. TIMED focuses on the portion of this region located approximately 60 to 180 kilometers above the surface. From studying portions of Earth's atmosphere, scientists believe global change is occurring, primarily due to variations in the Sun's cycle and the human-induced release of gases such as methane and carbon dioxide into the atmosphere. The TIMED E/PO Web site offers activities, a Teacher's Corner, and TIMED lesson plans.
Lead: Ms. Kerri Beisser, Johns Hopkins University Applied Physics Laboratory, 11100 Johns Hopkins Road, Laurel, MD 20723-6099. E-mail: *kerri.beisser@jhuapl.edu*. Phone: 443-778-6050.
URL: *htp://www.timed.jhuapl.edu*
Activities: MESSENGER: Student Support [A304]
"Passport To The Solar System" (PTSS) [A228]
"Science Concepts in Context" [A233]
Student Observation Network: Tracking a Solar Storm [A253]
Sun-Earth Day-Ancient Observatories-Timeless Knowledge [A440]
TIMED: Public Outreach [A442]
TIMED: Student Events [A321]
TIMED: Student Support [A322]
TIMED: Teacher Support [A123]

Other NASA Programs

B90. Living With a Star Program Office

LWS/PO
Description: Living With a Star (LWS) is a NASA initiative that addresses aspects of the Sun-Earth system that affect life and society. This program is a part of the Sun-Earth Connection (SEC) theme within the SMD. The program elements are (1) a space weather research network; (2) theory, modeling, and data-analysis programs; (3) space environment test beds; and (4) established and expanded partnerships.
Lead: Dr. Evelina Felicit-Maurice, NASA Goddard Space Flight Center, Code 460, Bldg. 6, Room S141, Greenbelt Road, Greenbelt, MD 20771-0001. E-mail: *efelicit@pop400.gsfc.nasa.gov*. Phone: 301-286-6949.
URL: *http://lws.gsfc.nasa.gov*
Activities: Astronomy Institute [A43]
Charged Particle Motion in Earth's Magnetosphere [A177]
Connecting the Sun, Earth, Sunspots, and Climate [A178]
Earth's Atmosphere Understood Through Graph Reading [A188]
Educational Family Guides to the Sun and Mars [A189]
Goddard Days [A404]
IMAGE: Radiation Belts and Trapped Particles [A204]
Living With a Star (LWS) Student Internship [A6]
Living With a Star (LWS): Followup Program and School Visits [A19]
Living With a Star (LWS): Inservice Teachers Workshop [A86]
Living With a Star (LWS): Master Teacher Leadership and Mentor Program [A87]
Living With a Star (LWS): Preservice Workshop [A88]
LWS: STEM Institute for Administrators [A144]
"Our Star the Sun": Summer Institute [A101]
"Passport To The Solar System" (PTSS) [A228]

"Science Concepts in Context" [A233]
Scientists in Schools: Preparing for K–12 Outreach [A234]
Space Place: Conferences [A241]
Students United with NASA Becoming Enthusiastic About Math and Science (SUNBEAMS) [A33]
Workshops, Sessions, and Seminars for Scientists and E/PO Leads on K–14 Education and Public Outreach [A520]

B91. Solar Dynamics Observatory

SDO

Description: The Solar Dynamics Observatory (SDO) project is the first of the Living With a Star (LWS) programs under the Sun-Earth Connection (SEC) theme at NASA. The project goals are to understand the solar variations that influence life on Earth and humanity's technological systems by determining (1) how the Sun's magnetic field is generated and structured and (2) how this stored energy is converted and released into the heliosphere and geospace in the form of solar wind, energetic particles, and variations in the solar irradiance. The SDO E/PO program will focus primarily on informal education and public outreach efforts that share NASA's vision to "inspire the next generation of explorers, as only NASA can," promote science literacy, and raise public awareness of the SEC theme, with emphasis on SDO research and discoveries.

Lead: Ms. Emilie Drobnes, NASA Goddard Space Flight Center, Code 682.3, Greenbelt Road, Greenbelt, MD 20771-0001. E-mail: *Emilie@ihy.gsfc.nasa.gov*. Phone: 301-286-3146.

URL: *http://sdo.gsfc.nasa.gov*

Activities: Solar Dynamics Observatory (SDO): Education Initiatives for Museums, Planetariums, and Science Centers [A371]
Solar Dynamics Observatory (SDO): Educator Workshops [A107]
Solar Dynamics Observatory (SDO): Other Educational Projects [A238]
Space Science Workshops for Educators [A109]

B92. Space Technology-5 (New Millennium)

ST-5

Description: The Space Place has involved ST-5 in various events/activities. We attend conferences to promote Space Place and all of the projects involved with the Web site. Usually, mission- or Space Place-related items are passed out. Libraries, science museums, planetariums, zoos, and aquariums across the United States have formed "Club Space Place" partnerships with NASA. They get Space Placeñprovided display materials, an activity guide, and handouts for an original group activity. Through these partnerships, we promote the Space Place Web site and NASA missions. Club Space Place provides quarterly interdisciplinary hands-on activities that are space- or Earth scienceñrelated. These quarterly activities go to the Space Place library and museum partners, Boys & Girls Clubs of America, the YWCA, and the Civil Air Patrol. Currently, there are 272 partners reaching thousands of children. On a monthly basis, Space Place provides articles for over 20 newspapers nationwide in both English and Spanish. The combined readership of these newspapers adds up to more than 2.5 million. The articles always end with information on activities and links to the Space Place Web site and the SMD mission Web sites. Diane Fisher submits articles to "Technology and Children" magazine four times a year and to "The Technology Teacher" magazine eight times a year. Each article published under the Space Place header refers to a particular mission. Each "Technology and Children" publication reaches an estimated 1,400 teachers and their students (possibly 42,000 children), and each "The Technology Teacher" publication reaches an estimated 8,000 teachers and their students (possibly 224,000 children). Each article is also posted on ITEA's Web site, which reaches an even wider audience. The dynamic Space Place Web site offers interactive experiences and fun facts for children and adults. The Space Place is supported by the New Millennium Program. It reaches an average of 3,000 Web users per day.

Lead: Ms. Nancy Leon, NASA Jet Propulsion Laboratory, M/S 171-350, 4800 Oak Grove Drive, Pasadena, CA 91109. E-mail: *Nancy.J.Leon@jpl.nasa.gov*. Phone: 818-354-1067.

URL: *http://spaceplace.nasa.gov*

Activities: Designing Nature's Way [A184]
Space Place: Conferences [A241]
Space Place: Contributions to "National Association for Bilingual Education (NABE) News" [A489]
Space Place: Contributions to ITEA's "The Technology Teacher" [A242]
Space Place: Contributions to Newspapers [A490]
Space Place: Web Site [A243]

International Missions with NASA Participation

B93. Yohkoh

Description: Yohkoh, an observatory for studying x rays and gamma rays from the Sun, was a project of the Institute for Space and Astronautical Sciences, Japan. The spacecraft was built in Japan, but contributions to the observing instruments were made by the United States and Great Britain. Yohkoh was launched in August 1991; the spacecraft lost attitude control in December 2001, and recovery attempts were unsuccessful.

URL: *http://www.lmsal.com/SXT/*

Activities: "Passport To The Solar System" (PTSS) [A228]
"Science Concepts in Context" [A233]
Solar Week [A240]

PLANETARY SCIENCE MISSIONS

Major Missions

B94. Cassini-Huygens Probe

Description: The Cassini-Huygens E/PO mission is dedicated to bringing the excitement of the Cassini mission and the Saturn system to audiences throughout the Nation and abroad. Educational activities, cooperative educator programs, educator conferences, public Web access, media support and releases, museum participation, and the Cassini Speakers' group are just a few of the ways we seek to engage the public in this multinational exploration program about Saturn. The formal education component focuses on "Reading, Writing, and Rings," an integrated reading and language arts program for grades 1–4. The Saturn Observation Campaign (SOC) brings amateur astronomers into the Cassini community. Members host star parties where participants view Saturn. The "Ring World" planetarium show is targeted at midrange planetariums. Ongoing efforts include Cassini Speakers, Solar System Ambassador support, and the 5ñ12 formal education program "Saturn in Your Kitchen and Backyard."

Contact: Ms. Jane Houston Jones, NASA Jet Propulsion Laboratory, 4800 Oak Grove Drive, Pasadena, CA 91109. E-mail: *Jane.H.Jones@jpl.nasa.gov*. Phone: 818-393-6435.

URL: *http://saturn.jpl.nasa.gov*

Activities:
Cassini: Classroom Visits [A267]
Cassini: Public Talks [A392]
Cassini: "Ring World" Planetarium Showings [A458]
GAVRT: Classroom Implementation-Cassini Mission [A275]
GAVRT: Scientist/Student Teleconferences [A279]
"Mission to Saturn" Planetarium Show [A362]
"Passport To The Solar System" (PTSS) [A228]
"Science Concepts in Context" [A233]
"Secrets of Saturn" Sky Show [A370]
Space Science Workshops for Educators [A109]

B95. Galileo

Description: The primary focus of the Galileo E/PO program has been to archive our scientific achievements using the Galileo Web site. Support of speakers and Solar System Ambassadors continued until Galileo's end-of-mission impact on Jupiter in September 2003.

Lead: Ms. Shannon McConnell, NASA Jet Propulsion Laboratory, MS 230-101, 4800 Oak Grove Drive, Pasadena, CA 91109. E-mail: *shannon.mcconnell@jpl.nasa.gov*. Phone: 818-393-5815.

URL: *http://jpl.nasa.gov/galileo*

Activities:
"Passport To The Solar System" (PTSS) [A228]
"Science Concepts in Context" [A233]

B96. Jet Propulsion Laboratory Solar System Exploration Theme Lead

JPL SSE

Description: The JPL SSE Theme Lead coordinates the activities of JPL's solar system exploration mission outreach coordinators and specialists in media relations, television production, Internet services, and education (both formal and informal). The Theme Lead also coordinates the science data analysis and research activities of the missions.

Lead: Ms. Anita Sohus, NASA Jet Propulsion Laboratory, 4800 Oak Grove Drive, Pasadena, CA 91109. E-mail: *Anita.M.Sohus@jpl.nasa.gov*. Phone: 818-354-6613.

Activities:
Cosmos in the Classroom 2004-Resource Book [A11]
"MarsQuest" Planetarium Show [A359]
NASA Planetary Science Summer School [A10]
"Passport To The Solar System" (PTSS) [A228]
"Science Concepts in Context" [A233]
Solar System Educators Program (SSEP) [A157]
Space Science Workshops for Educators [A109]
Sun-Earth Day-Ancient Observatories-Timeless Knowledge [A440]
"To Mars with MER" [A501]

Mars Exploration Program

B97. Mars Public Engagement

Description: Mars exploration will be NASA's signature effort in planetary science over the next two decades. This program, the largest in SMD, will provide regular and frequent voyages to Mars. Such a compelling program deserves forward-looking initiatives to engage the public in Mars exploration, scientific discovery, and technological achievements. These initiatives are covered in a long-term Mars Public Engagement Plan. Just as Mars missions have been organized into a program where each element strategically complements and builds on another, the Mars Public Engagement Plan creates a focused, cohesive, highly leveraged program in its collection of planned activities. Mars public engagement is conducted at the program level, covering missions scheduled for Mars destinations over the next two decades. This organization prevents the need to reinvent

the wheel with each mission, allows continuity in programming beyond the official end dates of missions, and provides the ability to develop strong, stable, and common infrastructures with long-term partners. The benefit of a 20-year plan is that public engagement initiatives will have time to bear fruit. Also, the contributions and discoveries of each mission can be intimately linked to the rich and compelling science and technology goals of the Mars Exploration Program for greater public understanding of what NASA seeks to achieve in its systematic exploration of Mars. (The term "public engagement" includes all formal education, informal education, and public information and outreach activities. Missions include Mariner 3–4 and 6–9, Viking 1 and 2, Mars Pathfinder, Mars Global Surveyor, Mars Odyssey, Mars Exploration Rovers, U.S. participation in Mars Express, Mars Reconnaissance Orbiter, and Mars Science Laboratory, as well as coordination with Mars Netlander, Mars Scout, and other Mars areas that receive their E/PO funding from other sources.)

URL: *http://mars.jpl.nasa.gov*

Activities:
Mars: Classroom Visits [A298]
Mars: Documentary Interviews [A415]
Mars: Formal Educator Field Trips [A145]
Mars: Formal Educator Workshops [A89]
Mars: Imagine Mars [A299]
Mars: Informal Educator Workshops [A379]
Mars: Lectures at Museums and Other Informal Education Venues [A416]
Mars: Mars Exploration Student Data Team [A300]
Mars: Mars Robotics Education Partnership [A301]
Mars: Mars Student Imaging Project [A302]
Mars: Models and Exhibits [A358]
Mars: Museum Visualization Alliance [A384]
Mars: Public Talks [A417]
Mars: Public Tours [A418]
Mars: Rock Around the World [A419]
Mars: Student Workshops [A303]
Mars: Web Site Science, Engineering, and Educational Content Development [A477]
Mars: Web Spotlights [A478]
"MarsQuest" Planetarium Show [A359]
"MarsQuest" Traveling Exhibit [A360]
"Passport To The Solar System" (PTSS) [A228]
"Science Concepts in Context" [A233]
Space Science Workshops for Educators [A109]
"To Mars with MER" [A501]

B98. 2001 Mars Odyssey

Description: The 2001 Mars Odyssey orbiter is mapping the mineralogy and morphology of the Martian surface. It is achieving global mapping of the elemental composition of the surface and the abundance of hydrogen in the shallow subsurface. (The 2001 Mars Odyssey was launched on April 7, 2001, and arrived at Mars on October 24, 2001.)

URL: *http://mars.jpl.nasa.gov/odyssey/*

Activities: "To Mars with MER" [A501]

B99. Mars Exploration Rover Mission

MER

Description: Two powerful new Mars rovers were sent on their way to the Red Planet. MER-A (Spirit) was launched on June 10, 2003, and MER-B (Opportunity) on July 7, 2003. MER-A landed on January 3, 2004, and MER-B on January 24, 2004. With far greater mobility than the1997 Mars Pathfinder rover, these robotic explorers will be able to trek up to 100 meters (about 110 yards) across the surface each Martian day. Each rover will carry a sophisticated set of instruments that will allow it to search for evidence of liquid water that may have been present in the planet's past. The rovers are identical to each other but will land on different regions of Mars.

URL: *http://mars.jpl.nasa.gov/classroom/*

Activities:
"MarsQuest" Traveling Exhibit [A360]
"Passport To The Solar System" (PTSS) [A228]
"Science Concepts in Context" [A233]
Space Science Workshops for Educators [A109]
"To Mars with MER" [A501]

B100. Mars Global Surveyor

MGS

Description: The MGS is returning an unprecedented amount of data regarding the Martian surface features, atmosphere, and magnetic properties. Scientists are using the data gathered from this mission both to learn about Earth by comparing it to Mars and to build a comprehensive data set to aid in planning future missions. (The MGS was launched on November 7, 1996.)

URL: *http://mars.jpl.nasa.gov/mgs/*

Activities:
"MarsQuest" Traveling Exhibit [A360]
"Passport To The Solar System" (PTSS) [A228]

"Science Concepts in Context" [A233]
"To Mars with MER" [A501]

B101. Mars Pathfinder

Description: Mars Pathfinder launched December 2, 1996, and arrived on the surface of Mars on July 4, 1997. The mission was an engineering demonstration of key technologies and concepts for use in future missions to Mars; it also delivered science instruments to the surface of Mars to investigate the structure of the Martian atmosphere, its surface meteorology, its surface geology, its form and structure, and the elemental composition of Martian rocks and soil. A small, 10-kilogram (22-pound) rover was carried on the Pathfinder and became the first rover ever to explore the Martian surface. The last communication from the spacecraft was received on September 27, 1997, and the spacecraft was officially declared dead on March 10, 1998.
URL: *http://mpfwww.jpl.nasa.gov/default.html*
Activities: "Passport To The Solar System" (PTSS) [A228]
"Science Concepts in Context" [A233]
"To Mars with MER" [A501]

B102. Mars Reconnaissance Orbiter

MRO
Description: MRO will focus on analyzing the surface at new scales in an effort to follow tantalizing hints of water detected in images from the Mars Global Surveyor spacecraft and to bridge the gap between surface observations and measurements from orbit. For example, the Reconnaissance Orbiter will measure thousands of Martian landscapes at 20- to 30-centimeter (8- to 12-inch) resolution, good enough to observe rocks the size of beach balls.
URL: *http://mars.jpl.nasa.gov/missions/future/2005-plus.html*
Activities: Compact Reconnaissance Imaging Spectrometer for Mars (CRISM): Public Outreach [A395]
CRISM: Curriculum Guide [A179]
CRISM: Cut-Out Paper Model [A180]
CRISM: Fact Sheet [A181]
CRISM: Web Site [A182]
MESSENGER: Student Support [A304]
New Horizons: Special Interest Groups and Scouts [A423]
"To Mars with MER" [A501]

B103. Mars Science Laboratory

MSL
Description: MSL is a roving, long-range, long-duration science laboratory that will be a major leap in surface measurements and pave the way for a future sample-return mission. NASA is studying options to launch this mobile science laboratory mission as early as 2007. This capability will also demonstrate the technology for "smart landers" with accurate landing and hazard-avoidance abilities to access what may be very promising but difficult-to-reach scientific sites.
URL: *http://solarsystem.nasa.gov/missions/profile.cfm?Sort=Chron&Mission=MarsSciLab*
Activities: "To Mars with MER" [A501]

B104. Viking

Description: NASA's Viking project found a place in history when it became the first mission to land a spacecraft safely on the surface of another planet. Two identical spacecraft, each consisting of a lander and an orbiter, were built. Each orbiter-lander pair flew together and entered Mars orbit; the landers then separated and descended to the planet's surface. The Viking 1 Lander touched down on the western slope of Chryse Planitia (the Plains of Gold), while the Viking 2 lander settled down at Utopia Planitia. Besides taking photographs and collecting other science data on the Martian surface, the two landers conducted three biology experiments designed to look for possible signs of life. These experiments discovered unexpected and enigmatic chemical activity in the Martian soil, but these provided no clear evidence for the presence of living microorganisms in the soil near the landing sites. According to scientists, Mars is self-sterilizing. They believe that the combination of solar ultraviolet radiation that saturates the surface, the extreme dryness of the soil, and the oxidizing nature of the soil chemistry prevent the formation of living organisms in Martian soil. The Viking mission was planned to continue for 90 days after landing. Each orbiter and lander operated far beyond its designed lifetime. The Viking 1 Orbiter functioned until July 25, 1978, while the Viking 2 Orbiter continued for 4 years and 1,489 orbits of Mars, concluding its mission on August 7, 1980. Because of the variations in available sunlight, both landers were powered by radioisotope thermoelectric generators-devices that create electricity from heat given off by the natural decay of plutonium. That power source allowed long-term science investigations that otherwise would not have been possible. The last data from the Viking 2 Lander arrived at Earth on April 11, 1980. The Viking 1 Lander made its final transmission to Earth on November 11, 1982.
URL: *http://www.jpl.nasa.gov/missions/past/viking.html*
Activities: "Passport To The Solar System" (PTSS) [A228]
"Science Concepts in Context" [A233]

New Frontiers

B105. New Horizons (Pluto-Kuiper Belt) Mission

Description: New Horizons is a mission to the unexplored edge of our solar system; it was designed to provide the first close look at Pluto, Charon, and their icy, rocky relatives in the Kuiper Belt. Scheduled to launch in 2006 and reach Pluto-Charon by 2015, New Horizons will be the first NASA planetary spacecraft in two decades to train its instruments on a "new" world. The New Horizons payload is designed to answer critical questions about Pluto, Charon, and the other unexplored bodies in the outer solar system, such as how the bodies look, what they are made of, and what their atmospheres are like. The mission plans to map surface appearance with visible-wavelength cameras, study surface composition by spectra in the near infrared, and probe atmospheres in detail with ultraviolet spectrometers and radio waves. The New Horizons E/PO plan includes educator training, education programs and curriculum modules, a mission Web site, broadcast events, student press conferences, and a guest observer program. Public awareness efforts include cosponsored lectures, informal programs, and exhibits at science museums nationwide. The E/PO program also includes the Student Dust Counter, a special instrument designed by students at the University of Colorado at Boulder. The device, which will detect dust grains produced by collisions between asteroids, comets, and Kuiper Belt objects during New Horizons' journey, will be the first science instrument on a NASA planetary mission to be designed, built, and flown by students.

Lead: Ms. Kerri Beisser, Johns Hopkins University Applied Physics Laboratory, 11100 Johns Hopkins Road, Laurel, MD 20723-6099. E-mail: *kerri.beisser@jhuapl.edu*. Phone: 443-778-6050.

URL: *http://www.pluto.jhuapl.edu/*

Activities:
MESSENGER: Student Support [A304]
New Horizons: Fact Sheet [A223]
New Horizons: Growth Chart Poster [A224]
New Horizons: Public Outreach [A422]
New Horizons: Special Interest Groups and Scouts [A423]
New Horizons: Student Support [A309]
New Horizons: Teacher Support [A97]
New Horizons: Web Site [A225]
Pluto or Bust! [A229]
Space Place: Contributions to ITEA's "The Technology Teacher" [A242]
Space Place: Contributions to Newspapers [A490]
TIMED: Teacher Support [A123]

Discovery

B106. Discovery Program Support Office

DPSO

Description: NASA's Discovery program is composed of a series of highly focused, competitively selected planetary science investigations. Discovery missions aim to enhance our understanding of the solar system by exploring the planets, their moons, and other small bodies using innovative approaches to ensure the highest science value for the cost. Ten missions have been selected since the program began in 1992. Discovery program E/PO efforts are designed to promote the program and awareness of the missions. This is done through a Web site, a quarterly newsletter, outreach products and informational materials developed for a variety of audiences, and presentations given in various venues. The Discovery program works with Discovery mission E/PO personnel to identify and develop E/PO opportunities, coordinate with the program, and ensure that mission activities are consistent with NASA SMD E/PO strategy.

Lead: Ms. Shari Asplund, NASA Jet Propulsion Laboratory, 4800 Oak Grove Drive, Pasadena, CA 91109. E-mail: *shari.e.asplund@jpl.nasa.gov*. Phone: 818-354-7280.

URL: *http://discovery.nasa.gov*

Activities:
Discovery Program Office: Miscellaneous [A464]
Discovery Program: Conferences [A53]
"Passport To The Solar System" (PTSS) [A228]

B107. Comet Nucleus Tour

CONTOUR

Description: The E/PO efforts of the CONTOUR mission have been aimed at bringing the thrill of exploration and the wonder of discovery into classrooms and homes through unique educational experiences. We invite teachers, students, and the public to participate in scientific inquiry, discovery, and insight into the complex and awesome nature of comets. Through media, the Internet, and classroom curricula we reach out to the educational community and the public to inspire their curiosity and satisfy their interest in the study of comets. Although the CONTOUR spacecraft was lost, information on the mission science, education, and outreach continues to be made available.

Lead: Ms. Laura Lautz, Cornell University, 310 Space Sciences Building, Ithaca, NY 14853. E-mail: *lautz@astro.cornell.edu*. Phone: 607-254-4973.

URL: *http://www.contour2002.org/*

Activities:
"Passport To The Solar System" (PTSS) [A228]

B108. Deep Impact

Description: The Deep Impact mission outreach plan specializes in five audiences: educators, students, the public (including informal), the underserved, and amateur astronomers.
Lead: Dr. Lucy McFadden, University of Maryland, Department of Astronomy, College Park, MD 20742. E-mail: *McFadden@astro.umd.edu*. Phone: 301–405-2081.
URL: *http://deepimpact.jpl.nasa.gov*
Activities: Deep Impact: Amateur Astronomers Partnership [A397]
Deep Impact: Educator Training [A51]
Deep Impact: Public/Informal Events [A398]
Deep Impact: Web Site [A463]
Space Place: Contributions to Newspapers [A490]

B109. MErcury Surface, Space ENvironment, GEochemistry, and Ranging

MESSENGER
Description: MESSENGER is a scientific investigation of the planet Mercury. Understanding Mercury and the forces that have shaped it is fundamental to understanding the terrestrial planets and their evolution. MESSENGER is a mission to orbit Mercury following two flybys of that planet. MESSENGER will investigate key scientific questions regarding Mercury's characteristics and environment during these two complementary mission phases. Data will be provided by an optimized set of miniaturized space instruments and the spacecraft's telecommunications system. MESSENGER will enter Mercury's orbit in April 2009 and carry out comprehensive measurements for 1 year. Data collection will conclude in April 2010. Working in close coordination with the mission's science team, a carefully selected group of E/PO professionals has been designing a comprehensive set of activities to coordinate with MESSENGER events. The activities are designed for college education and public interest. These activities include teacher training, curriculum development, unique student investigations and experiments related to MESSENGER, a television documentary, museum displays, and special outreach to underserved and minority students. The full multifaceted E/PO program is carried out with an extensive network of individual and institutional partners throughout the country. The E/PO effort is organized around overarching themes that reflect the science, engineering, technology, and people of the mission. The MESSENGER themes are Comparative Planetology, The Solar System Through History, and Framing Pathways to Answers: The Scientific Process in Action. The thematic framework is also informed by both content and pedagogy standards articulated in the National Science Education Standards and Benchmarks for Science Literacy. For the duration of the mission, the E/PO team will create and disseminate materials that focus on telling MESSENGER's many stories to a broad and diverse audience.
Lead: Ms. Stephanie Stockman, Science Systems and Applications, Inc., 5900 Princess Garden Parkway, Suite 300, Lanham, MD 20706. Phone: 301-614-6457.
URL: *http://messenger.jhuapl.edu*
Activities: MESSENGER Educator Fellowship Program [A92]
MESSENGER: NASA Explorer Institute [A380]
MESSENGER: National Meetings [A420]
MESSENGER: Student Support [A304]
New Horizons: Special Interest Groups and Scouts [A423]
"Passport To The Solar System" (PTSS) [A228]
"Staying Cool" Training Workshop [A113]
Sun-Earth Day-Ancient Observatories-Timeless Knowledge [A440]
Testing Ideas About Light [A120]
TIMED: Teacher Support [A123]

B110. Near-Earth Asteroid Rendezvous

NEAR
Description: As the first spacecraft to orbit and land on an asteroid, the NEAR mission continues to answer fundamental questions about the nature and origin of near-Earth objects. These objects are the primary source of large bodies that collide with Earth, and primitive asteroids, comets, and meteorites also preserve clues about the nature of early solar system processes and conditions. These clues have been altered or destroyed on large, planet-size bodies by processes of planetary evolution. (NEAR was launched in February 1996; asteroid landing and final communication occurred in February 2001.)
URL: *http://near.jhuapl.edu/*
Activities: MESSENGER: Student Support [A304]
New Horizons: Special Interest Groups and Scouts [A423]
"Passport To The Solar System" (PTSS) [A228]
"Science Concepts in Context" [A233]
TIMED: Teacher Support [A123]

B111. Stardust

Description: The Stardust education Web site is designed to enhance the breadth, flexibility, and knowledge of science, mathematics, and technology between K–12 education and higher education, recognizing and supporting a diverse set of programs while improving scientific literacy among students. The materials found on this home page are aligned with the National Science Education Standards and have been designed primarily for use by grades 5–8. The Stardust E/PO team is composed of many partners, which include the Challenger Center

for Space Science Education, the JASON Foundation for Education; Omniplex at the Kirkpartick Science and Air Space Museum; Space Explorers, Inc.; the Virginia Space Grant Consortium; Parents And Children as Co-Travelers (PACCT); NASA's Jet Propulsion Laboratory (JPL) Ambassadors Program; the JPL Solar System Educator Program; the "From the Sun to the Star Nations" Native American outreach initiative; and Space Place. The Stardust mission participates in and sponsors teacher training and curriculum development programs targeted to minorities and underserved communities, along with the public at large. Other resources available include an interactive Web site, an educational planetarium program, video animation, and library and museum exhibits.

Lead: Ms. Aimee Meyer, NASA Jet Propulsion Laboratory, 4800 Oak Grove Drive, Pasadena, CA 91109. E-mail: *aimee.meyer@jpl.nasa.gov*. Phone: 818-354-3245.

Contact: Ms. Aimee Meyer, NASA Jet Propulsion Laboratory, 4800 Oak Grove Drive, Pasadena, CA 91109. E-mail: *aimee.l.whalen@jpl.nasa.gov*. Phone: 818-354-3245.

URL: *http://stardust.jpl.nasa.gov*

Activities: "Science Concepts in Context" [A233]
Space Place: Contributions to "National Association for Bilingual Education (NABE) News" [A489]
Space Place: Contributions to Newspapers [A490]
Space Place: Web Site [A243]

Other NASA Programs

B112. Astromaterials Program

Description: The Astromaterials program at NASA's Johnson Space Center curates and distributes samples of other bodies in the solar system to researchers around the world. Astromaterials include samples collected by NASA missions (e.g., Apollo Moon rocks, Genesis solar wind ions, and Stardust comet particles) and samples collected on Earth (e.g., meteorites from Antarctica and cosmic dust from the stratosphere). Astromaterials E/PO focuses on the scientific study of extraterrestrial materials and their use in education. The program is based on collaboration between scientists at Johnson and educators. A long-term example is the distribution of lunar and meteorite samples to schools through partnerships with the NASA Office of Education. Recent major projects include (1) development of classroom activities in partnership with K–12 teachers and the presentation of the activities in teacher workshops, (2) collaboration with two minority universities on a Houston-wide outreach program, and (3) development of exhibits and planetarium shows in partnership with museums.

Lead: Dr. Marilyn Lindstrom, NASA Johnson Space Center, 2101 NASA Road 1, Houston, TX 77058. E-mail: *marilyn.lindstrom-1@nasa.gov*. Phone: 281–483-5135.

URL: *http://curator.jsc.nasa.gov*

Activities: "Exploring the Solar System": Teacher Workshops [A59]

B113. Deep Space 1

DS1

Description: The Space Place has involved DS1 in the following events/activities: We attend conferences to promote Space Place and all of the projects involved with the Web site. Usually, mission- or Space Place-provided display materials, an activity guide, and handouts for an original group activity. Through these partnerships, we promote the Space Place Web site and NASA Jet Propulsion Laboratory missions. Club Space Place provides quarterly interdisciplinary hands-on activities that are space- or Earth science-related. These quarterly activities go to the Space Place library and museum partners, Boys & Girls Clubs of America, the YWCA, and the Civil Air Patrol. Currently, there are 272 partners reaching thousands of children. On a monthly basis, Space Place provides articles for over 20 newspapers nationwide in both English and Spanish. The combined readership for these newspapers totals more than 2.5 million. The articles end with information on activities and links to the Space Place Web site and NASA mission Web sites. Diane Fisher submits articles to "Technology and Children" magazine four times a year and to "The Technology Teacher" magazine eight times a year. Each article published under the Space Place insignia refers to a particular mission. "Technology and Children" reaches an estimated 1,400 teachers and their students (up to 42,000 children), and "The Technology Teacher" reaches an estimated 8,000 teachers and their students (up to 224,000 children). Each article is also posted on ITEA's Web site, which reaches an even wider audience. The Space Place Web site is a dynamic site that offers interactive experiences and fun facts for children and adults. Space Place is supported by the New Millennium program.

Lead: Ms. Nancy Leon, NASA Jet Propulsion Laboratory, M/S 171-350, 4800 Oak Grove Drive, Pasadena, CA 91109. E-mail: *Nancy.J.Leon@jpl.nasa.gov*. Phone: 818-354-1067.

URL: *http://spaceplace.nasa.gov*

Activities: "Passport To The Solar System" (PTSS) [A228]

B114. Deep Space Mission System

DSMS

Description: The DSMS incorporates the Deep Space Network (DSN) and the infrastructure, software, and systems that support it. The goal of the DSMS E/PO is to build awareness of the critical role communication plays in solar system exploration. Without a means of communicating between spacecraft and Earth to relay commands and return science data, there could be no exploration. Frequent collaborations with NASA JPL missions using the DSMS tell this story, while previously produced printed materials and videos are distributed to educators and

to the public to offer further explanation. DSMS partners with JPL programs (Solar System Ambassadors, Solar System Educators, and a Native American initiative) to provide wider distribution of information and educational activities. The DSN is also used for science observation through radio astronomy, and one of the decommissioned 34-meter antennas is now part of an innovative educational program, the Goldstone Apple Valley Radio Telescope (GAVRT). Students can control this huge antenna via the Internet from their classrooms to gather and analyze data that are ultimately used by scientists at JPL.

Lead: Ms. Shirley Wolff, NASA Jet Propulsion Laboratory, 4800 Oak Grove Drive, Pasadena, CA 91109.
E-mail: *shirley.e.wolff@jpl.nasa.gov*. Phone: 818-354-4069.

URL: *http://deepspace.jpl.nasa.gov/dsn*

Activities: Deep Space Network (DSN): Educational Activities [A52]
Deep Space Network (DSN): Public Events [A399]
GAVRT: Classroom Implementation-Cassini Mission [A275]
GAVRT: Classroom Implementation-Jupiter Quest [A276]
GAVRT: Classroom Implementation-Quasar Variability Study [A277]
GAVRT: Classroom Implementation-Uranus [A278]
GAVRT: Educational Conferences and Outreach Activities [A62]
GAVRT: Scientist/Student Teleconferences [A279]
GAVRT: Teacher Training [A63]
Goldstone Communications Complex: Educational Activities [A281]
Goldstone Communications Complex: Public Tours [A405]
Goldstone Communications Complex: Student Tours [A282]
Goldstone Deep Space Communications Complex: Public Outreach [A406]

International Missions with NASA Participation

B115. Mars Express

Description: NASA is participating in a mission planned by the European Space Agency and the Italian Space Agency called Mars Express, which will explore the atmosphere and surface of Mars from polar orbit. NASA's involvement includes joint development of the radar instrument with the Italian Space Agency, support of U.S. science co-investigators, coordination of radio relay systems to make sure that different spacecraft will operate with each other, a hardware contribution to the energetic neutral atoms analyzer instrument, and the provision of backup tracking support during critical mission phases by NASA's Deep Space Network. Our contribution to the energetic neutral atoms analyzer instrument is called Analyzer of Space Plasma and Energetic Atoms (ASPERA)-3. ASPERA-3 was selected as a Discovery mission of opportunity; the complete instrument will study the interaction between the solar wind and the atmosphere of Mars, and it will attempt to determine what happened to the large amount of water that was once on Mars. The co-investigator being funded by NASA is Dr. David Winningham of the Southwest Research Institute, San Antonio, TX.

Activities: "MarsQuest" Traveling Exhibit [A360]